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WESTERN AUSTRALIAN HERBARIUM
DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Cover

Nuytsia floribunda (Labill.) R.Br. ex Fenzl—the Western Australian Christmas Tree. The journal is named after the plant, which in turn commemorates Pieter Nuijts, and ambassador of the Dutch East India Company, who in 1627 accompanied the "Gulde Zeepard" on one of the first explorations along the south coast of Australia.

Cover design by Sandra Bird.

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WESTERN AUSTRALIAN HERBARIUM,
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CONTENTS

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The genus Pyxine (Physciaceae, Lichenes) in Western Australia

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Abstract

Sammy, N. The genus *Pyxine* (Physciaceae, Lichenes) in Western Australia. Nuytsia 6(3): 279-284 (1988). The genus *Pyxine* has not been previously recorded in Western Australia. The four species *P. coccifera, P. cocoes, P. petricola* and *P. subcinerea* show a limited distribution along the coastal regions of Western Australia.

Introduction

Pyxine, like the other genera in the Physciaceae, is generally a pale ashy-white, light buff or greenish-grey colour. Imshaug (1957) divided the genus into two sections with further subsections, however Swinscow & Krog (1975), by examining the type specimens, have found that these subdivisions are based on variable characters. Imshaug's observations did draw attention to the pigmentation of an internal apothecial stipe as an important taxonomic character.

Materials and Methods

Types and other specimens of species within the genus *Pyxine* housed at the British Museum (Natural History) and the Conservatoire et Jardin Botaniques, Geneva, have been examined. The Western Australian material studied included specimens held in the Western Australian Herbarium (PERTH) and in the author's personal collections now housed in PERTH (hb. Sammy).

The chemical analyses were conducted according to the procedures set out by Culberson & Kristinsson (1970), Culberson (1972) and Menlove (1974). Anatomical sections were cut with a freezing microtome and mounted in Lactophenol cotton blue.

Comparative Studies

Samples of *Pyxine* may be confused with *Dirinaria* and *Physcia* in the field but this genus is distinguished by the following characters:

Apothecium. The mature apothecium is strongly convex and has a pseudo-lecideine appearance. The thalline exciple loses algal cells and becomes dark-coloured (Swinscow & Krog 1975). In contrast, *Physcia* and *Dirinaria* have lecanorine apothecia with concolorous thalline exciples.

Epithecium. The epithecium reacts K+ purple (Swinscow & Krog 1975). The reaction is best observed on vertical sections of the apothecium; the preparation being irrigated with potassium hydroxide (K) solution while viewing under the microscope. This reaction is absent in *Physcia* and *Dirinaria* (Awasthi 1975).

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Thallus. Under long wave ultra-violet light, the thallus in most species emits a bright lemon-yellow fluorescence, due to lichexanthone present in the cortex. This substance is not produced in *Physcia* and *Dirinaria.* This is a useful aid for generic identification of sterile specimens (Swinscow & Krog 1975).

Hypothecium. In vertical sections of a mature apothecium, the region below the hymenium is composed of dark reddish-brown hyphae forming a lens-shaped hypothecium. This region also reacts K+ purple. A coloured hypothecium is absent in *Physcia* and where present in *Dirinaria* is K-.

Lower Surface. The lower surface of the thallus in *Pyxine* is always black. Generally a specimen with a pale lower surface is referable to *Physcia.*

The four species of *Pyxine* found in Western Australia are readily separated by the following characters:

	Soralia	Medulla	UV Light	Chemistry
coccifera	red	yellow	negative to white	atranorin & pyxiferin
cocoes	white	white	lemon-yellow	lichexanthone
petricola	absent	white	lemon-yellow	lichexanthone
subcinerea	white	yellow	lemon-yellow	lichexanthone

Key to the Species

1. Soralia absent ..... 2. *P. petricola*
   Soralia present 2

2. Soralia red ..... 1. *P. coccifera*
   Soralia white 3

3. Medulla white ..... 3. *P. cocoes*
   Medulla yellow ..... 4. *P.subcinerea*

Taxonomy

1. Pyxine coccifera (Fee) Nyl., Mem. Soc. Sci. Nat. Cherbourg 5: 108 (1857). *Parmelia coccifera* Fee, Essai Crypt.: 126 (1824).

Thallus on bark of trees, loosely attached; lobes grey; pseudocyphellae red, linear, on lamina and lobe margins (Figure 1H), frequently developing into soralia with bright red granular soredia (Figure 1I); medulla creamy-yellow in the upper layers, white below. Apothecia not seen.

Chemistry. Cortex UV-; atranorin and pyxiferin (red pigment).

Specimens examined. WESTERN AUSTRALIA: Prince Regent River Reserve, Kimberley, *A.S. George* 12730 p.p. (PERTH); Prince Regent River Reserve, Kimberley, *A.S. George* 12301 p.p. (PERTH).

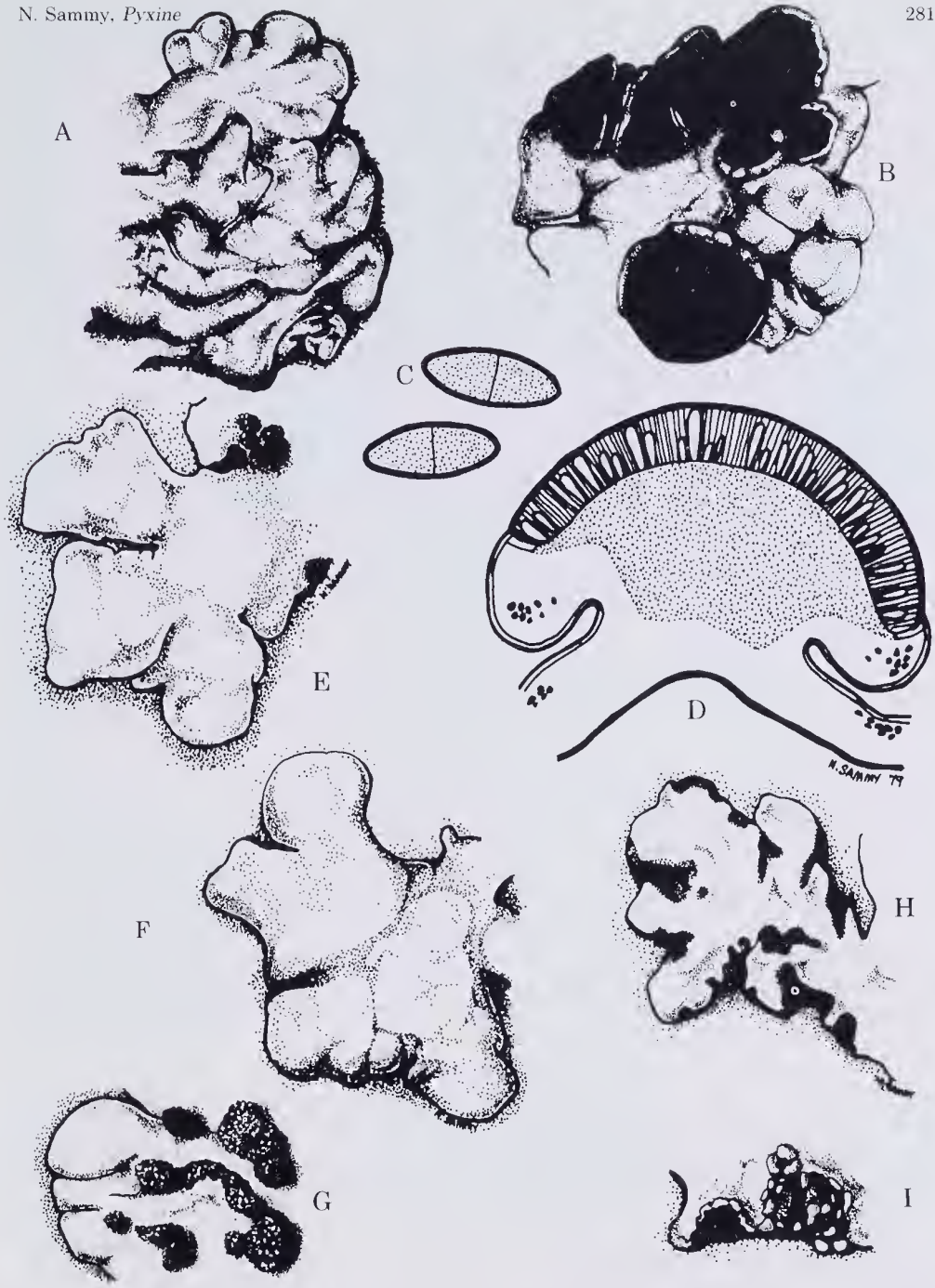

Figure 1. *Pyxine petricola.* A Marginal thallus lobes (x20). B—Apothecia in various developmental stages (x40). C—Mature ascospores (in water). D—Longitudinal section of mature apothecium showing development of dark reddish-brown hypothecium (x100).

Pyxine subcinerea. E—Marginal thallus lobes (x20) showing marginal soralia.

Pyxine cocoes. F—Marginal thallus lobes with distinct patches of pruina (x20). G—Marginal thallus lobes showing abundant marginal soralia (x10).

Pyxine coccifera. H—Marginal thallus lobes with marginal red pseudocyphellae (x20). I—Marginal lobe with pseudocyphellae developed into red granular soredia (x40).

2. **Pyxine petricola** Nyl. ap. Crombie, J. Bot., Lond. 14: 263 (1876). *Type:* Island of Rodrigues, *Dr. I.B. Balfour* 2391, Venus Transit Expedition, 9.x.1874 (holo: BM).

Pyxine meissneri Tuck. ex Nyl. var. *endoleuca* Muell. Arg., Flora, Jena 62: 290 (1879). *Type:* In territorio africano Djur, Seriba Ghattas, *Schweinfurth* (holo: G).

Pyxine subvelata Stirton, Trans. Proc. N.Z. Inst. 30: 396 (1897). *Type:* Queensland, Jimbour on *Hakea oleifolium*, F. M. Bailey, June 1895 (iso: BM).

Thallus on bark of shrubs, rarely on rocks, firmly attached, lobes white to grey-white; pruina laminal, shiny, towards margins of lobes; soralia absent (Figure 1A); medulla white. Apothecia abundant, black, plane with distinct thalline margins at first, becoming strongly convex at maturity (Figure 1B); hypothecium dark reddish-brown,lens-shaped (Figure 1E), sometimes this colouration extends downwards to produce an "internal stipe"; ascospores brown, bilocular, 16-18 x 5.2-6.5 μM (Figure 1C).

Chemistry. Cortex UV+; lichexanthone only.

Specimens examined. WESTERN AUSTRALIA: Houtmans Abrolhos, Suomi I., *N. Sammy* s.n. (PERTH, hb. Sammy); Houtmans Abrolhos, E. Wallaby I., *N. Sammy* s.n. (PERTH, hb. Sammy); Houtmans Abrolhos, Shark I., *N. Sammy* s.n. (PERTH, hb. Sammy); Lake MacLeod, near Carnarvon, *N. Sammy* s.n. (PERTH, hb. Sammy); Monkey Mia, Peron Peninsula, Shark Bay, *N. Sammy* s.n. (hb. Sammy); Beverley Springs Homestead, Kimberley, *B.G. Muir* s.n. (hb. Sammy); Head of Walgamungun Creek, Kimberley, *B.G. Muir* s.n. (hb. Sammy); Hidden Valley, Kununurra, West Kimberley, *G.G. Smith* s.n. (hb. Sammy).

3. **Pyxine cocoes** (Sw.) Nyl., Mem. Sco. Sci. Nat. Cherbourg 5: 108 (1857). *Lichen cocoes* Sw., Nova Gen. Sp. Pl.: 146 (1788).

Pyxine meissneri Tuck. ex Nyl. subsp. *connectans* Vainio, Acta Soc. Fauna Flora fenn. 7(1): 154 (1890).

Pyxine connectans (Vainio) Vainio, Suomal. Tiedeakat. Toim., Ser. A: 70 (1914). *Type*: Vainio Lich. Brasil. Exsicc. 62, Rio de Janerio, 1885 (iso: BM).

Pyxine cocoes f. *sorediigera* Muell. Arg., Bot. Jb. 20: 262 (1894). *Type*: Usambara, *Holst* 1423 (holo: G).

Pyxine oceanica Zahlbr. ap. Rock, Coll. Hawaii publ. Bull. 4: 37 (1916). *Type*: Zalhbruckner Lich. Rar. Exsicc. 207, Oceania, insula Palmyra, *J. Rock* (iso: BM).

Thallus on bark of trees and shrubs, firmly attached; lobes ashy-white to grey-white, flat, crowded and plicate; pruina laminal, shiny, towards margins of thallus (Figure 1F); soralia abundant, marginal, crowded towards centre of thallus (Figure 1G); soralia granular; medulla white. Apothecia not seen

Chemistry. Cortex UV+; lichexanthone only.

Specimens examined. WESTERN AUSTRALIA: Geraldton, Chapman River Bridge, *N. Sammy* s.n. (PERTH, hb. Sammy); Houtmans Abrolhos, Suomi I., *N. Sammy* s.n. (PERTH, hb. Sammy); Houtmans Abrolhos, Shark I., *N. Sammy* s.n. (PERTH, hb. Sammy); Houtmans Abrolhos, E. Wallaby I., *N. Sammy* s.n. (PERTH, hb. Sammy); NW of Lake Logue, S of Eneabba, *M. Blackwell* 2873 (hb. Sammy).

4. **Pyxine subcinerea** Stirton, Trans. Proc. N.Z. Inst. 30: 396 (1897). *Type*: Queensland, *F. M. Bailey* 22 (holo: BM).

Pyxine meissneri Tuck. ex Nyl. var. *sorediata* Muell. Arg., Flora, Jena 62: 290 (1879). *Type*: Djur, Brauneisenstein, Seriba Ghattas, *Schweinfurth*, 1877 (holo: G).

Pyxine chrysantha Vainio, Cat. Afr. Pl. Welwitsch 2: 412 (1901). *Type*: Golungo Alto, Angola, ad truncos arb. vigent. in sylvis primaevis prope Sange, *Welwitsch*, 1857 (lecto: BM).

Pyxine chrysanthoides Vainio, Suomal. Tiedeakat. Toim., Ser. A, 6: 71 (1914). *Type*: Antilles, Morne Rouge, *Vainio* (lecto: TUR).

Thallus on bark of trees, firmly attached (Figure 1D); lobes pale grey-green; pruina diffused towards lobe apices; soralia marginal, orbicular to irregularly shaped; soredia powdery, fine, white; medulla yellow. Apothecia not seen.

Chemistry. Cortex UV+; lichexanthone only.

Specimen examined. WESTERN AUSTRALIA: Lake Indoon, 11 km W of Eneabba, *N. Sammy* s.n. (hb. Sammy).

Phytogeography

There are 35 species of *Pyxine* known in the tropical and subtropical regions of the world (Poelt 1973); 23 species are recorded for East Africa, nine each for Papua New Guinea and South America, six in North America and four in South-east Asia. In Australia 15 species are recorded for Queensland and four in New South Wales (Filson 1983). Only three Australian species are endemic and found in Queensland. From observations made by the author in the tropics, *Pyxine* is not an inhabitant of virgin rain-forest. It can be found in open secondary rain-forest, on coastal vegetation or in the more open forest of the tropical highlands.

The seasonally wet (summer rains dominant) region of the Kimberleys, within the tropical belt of Western Australia, can be expected to be a refuge for tropical lichen species (Sammy 1985). The occurrence of three species of *Pyxine* in southern regions (winter rains dominant) may be explained by the presence of a warm oceanic current moving down the Western Australian coastline conducive to the formation of suitable microhabitats (Figure 2). The genus is absent from the large Pilbara region because it is situated in the semi-arid tropics.

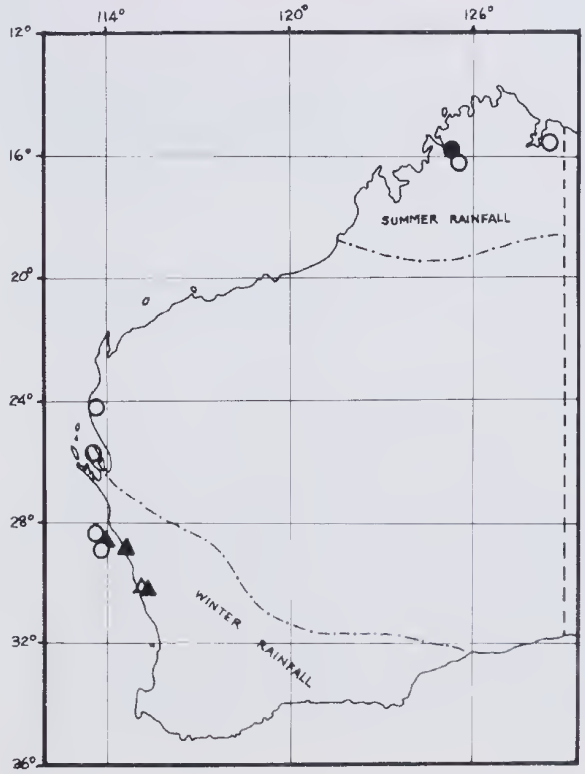

Figure 2. Distribution of *Pyxine* species in Western Australia. *Pyxine coccifera* (●), *Pyxine cocoes* (▲), *Pyxine petricola* (○), *Pyxine subcinerea* (△).

Acknowledgements

My overseas travel to examine type specimens was made possible by a grant from the Science and Industry Endowment Fund (CSIRO). The curators of the British Museum (Natural History), the Conservatoire et Jardin Botaniques, Geneva and the Western Australian Herbarium are thanked for permission to examine specimens. I wish to thank Mr Peter James (British Museum) for many useful and relevant discussions; Mr Gordon Smith (University of Western Australia), Mr A.S. George (previously of the Western Australian Herbarium) and Mr R.B. Filson (National Herbarium of Victoria) who critically read the manuscript and suggested improvements; Dr M. Sargent, Department of Chemistry, University of Western Australia, who donated samples of authentic lichen acids and discussed lichen chemistry.

I am grateful to my previous employer, Dampier Salt (Operations) Pty Ltd for allowing me time and facilities to complete this study.

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Studies on the Australasian Asclepiadaceae. I. *Brachystelma* Sims in Australia

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Abstract

Forster, P.I. Studies on the Australasian Asclepiadaceae. I. *Brachystelma* Sims in Australia. Nuytsia 6(3): 285-294 (1988). A taxonomic account of Australian *Brachystelma* Sims is given, with a single species, *B. microstemma* Schltr. recognised for which a lectotype is selected *Microstemma tuberosum* R.Br., *Brachystelma glabriflorum* F. Muell. and *B. papuanum* Schltr. are included in synonymy. Notes on variation, habitat and conservation status of *B. microstemma* are given.

Introduction

The last taxonomic treatment of the Australian Asclepiadaceae as a whole, was that of Bentham (1869) who recognised 53 native species in 14 genera. Little revisionary work has been undertaken since, and the generic and specific delimitation of Australasian material is in need of critical study. This initial contribution concentrates on specific taxa referred to the genera *Microstemma* R. Br. and *Brachystelma* Sims.

On examination of herbarium material at the Queensland Herbarium (BRI), it was evident that collections of *Microstemma tuberosum* R. Br. were congeneric with species of *Brachystelma* Sims, as recognised by Schlechter (1914). Due to the earlier publication of *Microstemma*, it was considered appropriate to propose conservation of *Brachystelma*, to avoid the approximately 100 new combinations necessary if the two genera were combined. The authorship of *Brachystelma* and its typification are discussed in Forster (1985, 1986).

Taxonomic History

The genus *Microstemma* R. Br. was first validly published in Brown (1810a). The entry in Farr et al. (1979) incorrectly cites Brown (1810b), issued as a preprint of Brown (1811), which although previously thought to be issued simultaneously with Brown (1810a), in fact postdated it by some 7 days (Mabberley 1985).

Brown's material originated from the voyage with Matthew Flinders in H.M.S. Investigator. This material was from Turtle Island in the Gulf of Carpentaria and is probably that drawn by the voyage's artist, Ferdinand Bauer, published by Endlicher (1838).

A second species, *M. glabriflorum* F. Muell., was described in 1858, based on a single collection from the Sea View Range, collected by Ferdinand von Mueller. Only two small specimens were found with few flowers. Mueller (1858) distinguished this species from *M. tuberosum* primarily by its glabrous corolla and the more prominent corona. Bentham (1869) noted, in addition, that the flowers were smaller and commented that *M. glabriflorum* may be only a variety of M. *tuberosum*.

Schlechter (1914), although recognising the prior publication of *Microstemma*, preferred to recombine *M. glabriflorum* into *Brachystelma* and provided a new name, *B. microstemma* Schltr. for *M. tuberosum* R. Br. to avoid creating a later homonym for *B. tuberosum* (Meerburg) R. Br. ex Sims (Forster 1985).

Materials & Methods

A request for material of *Microstemma* provided a number of specimens of *M. tuberosum* (hereinafter referred to as *Brachystelma microstemma*) which have been cultivated for several years. Herbarium material at BRI, CANB, DNA, MEL, NSW and PERTH, and selected material from BM, K and L was examined. The description of *B. microstemma* is based mainly on the live collections studied.

Taxonomic Treatment

Brachystelma Sims, Bot. Mag. 49: t. 2343 (1822); Endl., Gen. Pl. 8: 597 (1838); Decne. in DC., Prodr. 8: 646-647 (1844); Harv., Gen. S. Afr. Pl. edn 2. 242 (1868); Benth. in Benth. & Hook., Gen. Pl. 2: 781 (1876); Schltr., Bot. Jahrb. Syst. 20, Beibl. 51: 52-54 (1895); J. Bot. 35: 292 (1897); Bot. Jahrb. Syst. 50: 160-162 (1914); Bot. Jahrb. Syst. 52: 144-145 (1914); K. Schum., Nat. Pflanzenfam. 4, 2: 268 (1897); N.E. Br., Fl. Trop. Afr. 4,1: 471 (1903); Fl. Cap. 4,1: 833 (1908); Phill., Gen. S. Afr. Fl. Pl. edn 2: 607 (1951); Huber, Prodr. Fl. S. W. Afr. 114: 10 (1967); R. A. Dyer, Bothalia 10: 373 (1971); Gen. S. Afr. Fl. Pl. 487 (1975); Fl. S. Afr. 27, 4: 1-41 (1981); *Ceropegia, Brachystelma* and *Riocreuxia* in Southern Africa (1983); Walker, Asklepios 25: 92-106 (1982); Bruyns, Dinteria 17: 3-80 (1984). *Type*: *B. tuberosum* (Meerburg) R. Br. ex Sims.

Microstemma R. Br., Prodr. 459 (1810); On Asclepiad. 14 (1810); Trans. Wern. Soc. Nat. Hist. 1: 25-26 (1811); Endl., Gen. Pl. 8: 597 (1838); F. Muell. Fragm. Phyt. Austral. 1:58 (1858); Decne. in DC., Prodr. 17: 294-295 (1873); Benth. in Benth. & Hook., Gen. Pl. 2: 778-779 (1876); K. Schum., Nat. Pflanzenfam. 4, 2: 266 (1897). *Type*: *M. tuberosum* R. Br.

Decaceras Harv., Thes. Cap. 2: 9, t. 114 (1863); Gen. S. Afr. Pl. edn 2. 242 (1868); Schltr., J. Bot. 35: 291-292 (1897); K. Schum., Nat. Pflanzenfam. 4, 2: 266 (1897). *Type*: *D. huttonii* Harv.

Dichaelia Harv., Gen. S. Afr. Pl. edn 2. 241 (1868); Benth. in Benth. & Hook., Gen. Pl. 2: 780 (1876); Schltr., Bot. Jahrb. Syst. 18, Beibl. 45: 35-37 (1894); Bot. Jahrb. Syst. 20, Beibl. 51: 49-50 (1895); J. Bot. 35: 293 (1897); Bot. Jahrb. Syst. 52: 145 (1914); K. Schum., Nat. Pflanzenfam. 4, 2: 269 (1897); Bullock, Kew Bull. 1953: 358 (1953); Huber, Prodr. Fl. S. W. Afr. 114: 28 (1967). *Type*: *D. gerrardii* Harv.

Micraster Harv., Gen. S. Afr. Pl. edn 2. 242 (1868). *Type*: *M. pulchellus* Harv.

Lasiostelma Benth. in Benth. & Hook., Gen. Pl. 2: 776 (1876); Oliver, Hooker's Icon. Pl. 15, t. 1449 (1883); Schltr., J. Bot. 37: 61-62 (1899). *Type*: *L. sandersonii* Oliver.

Tapeinostelma Schltr., Verh. Bot. Vereins. Prov. Brandenburg. 35: 53 (1893); K. Schum., Nat. Pflanzenfam. 4, 2: 267-268 (1897). *Type*: *T. caffrum* Schltr.

Craterostemma K. Schum., Bot. Jahrb. Syst. 17: 154 (1893); Nat. Pflanzenfam. 4, 2: 266 (1897). *Type: C. schinzii* K. Schum.

Brachystelmaria Schltr., Bot. Jahrb. Syst. 20, Beibl. 51: 50-52 (1895); J. Bot. 35: 293 (1897); K. Schum., Nat. Pflanzenfam. 4, 2: 268: (1897). *Type*: not designated.

Aulostephanus Schltr., Bull. Herb. Boissier 4: 451 (1896). *Type*: *A. natalensis* Schltr.

Blepharanthera Schltr., Bot. Jahrb. Syst. 52: 146-148 (1914). *Type*: not designated.

Siphonostelma Schltr., Bot. Jahrb. Syst. 52: 148-149 (1914); Huber, Prodr. Fl. S. W. Afr. 114: 53 (1967). *Type*: *S. stenophyllum* Schltr.

Geophytic perennial herbs with a single tuber or cluster of fleshy, fusiform roots. Stems prostrate to erect, single or variously branched. Leaves opposite, sessile or with short petiole, pubescent or glabrous, generally without glands at lamina base. Flowers 1

to several in subsessile cymes or terminal, pedicellate, rarely pedunculate. Calyx without basal glands, 5 parted, generally ovate-lanceolate to linear-lanceolate, glabrous or pubescent. Corolla tube rarely longer than lobes, tubular, campanulate to flat; lobes 5, free or connate at tips, flat or replicate, broadest at base; glabrous or pubescent. Staminal corona 1-2 seriate, longer or shorter than staminal column; outer corona variously shaped; inner lobes usually incumbent on backs of anthers, rarely reduced to small swellings at base of anthers. Staminal column arising from base of corolla, anther connectives incurved or incumbent on column or suberect, oblong or subquadrate, without terminal appendage. Pollinia horizontal or erect, solitary in each anther cell, pellucid on inner margin. Caudicles linear-oblong, attached to base or midway along translators. Stigma usually conical-convex, not exceeding anthers. Follicles fusiform to linear-fusiform, glabrous, green or mottled. Seeds convex on one side, concave on other, with coma of numerous hairs at one end.

Distribution. About 100 species, occurring mainly in Africa, but also in India and Southeast Asia, with one species in Australia.

Brachystelma microstemma Schltr., Bot. Jahrb. Syst. 50: 160 (1914); *Microstemma tuberosum* R. Br., Prodr. 459 (1810); Endl., Icon. Gen. Pl. t. 60 (1838); F. Muell., Fragm. Phyt. Austral. 1: 58 (1858); Benth., Fl. Austral. 4: 345 (1869); Bailey, Queensland Fl. 3: 1014-1015 (1900); Bailey, Compr. Cat. Queensland. Pl. 335, t. 312 (1913); Back. & van der Brink Bakhuizen, Fl. Java 2: 257 (1965). *Lectotype* (here designated): Australia, Carpentaria, Turtle Island, Dec. 1802, *R. Brown* s.n. sub. *J.J. Bennett* 2880 (lecto: BM; isolecto: K).

Microstemma glabriflorum F. Muell., Fragm. Phyt. Austral. 1:58 (1858); Benth., Fl. Austral. 4: 345 (1869); *Brachystelma glabriflorum* (F.Muell.) Schltr., Bot. Jahrb. Syst. 50: 161 (1914). *Type*: Seaview Range, s. dat., *F. Mueller* s.n. (holo: K).

Brachystelma papuanum Schltr., Bot. Jahrb. Syst. 50: 161 (1914). *Type*: Nordostl. Neu-Guinea: auf grasigen Hugeln am Fuβe des Bismarck-Gebirges, *R. Schlechter* 18470 (holo: B, non vidi).

Tuber ovate to discoid or irregularly shaped, 1-8 cm diameter. *Stems* 20-85 cm long, 2-3 mm thick, upright, rarely branched, up to 9 nodes; internode length variable to 6 cm. *Leaves* often vestigial and scale-like, or well developed, narrowly linear-lanceolate, acuminate; firmly coriaceous, glabrous; 5-100 mm long, 2-10 mm wide. *Flowers* borne on top 1-5 nodes; borne between petioles of leaf pair, or terminal; in subsessile cymes, 1-few flowered; often next to scale-like leaves. *Flower pedicels* 7-20 mm long, filiform, greenish-yellow with faint purple spots, with short, greenish-yellow cilia; pendulous during anthesis. *Fruiting pedicels* erect 10-25 mm long. *Calyx segments* narrowly triangular, acute, 1 mm long, greenish yellow, with greenish-yellow cilia. *Corolla* deeply 5-parted; segments valvate in bud, afterwards widely patent and longitudinally conduplicate, ovate-oblong, 7-9(14) mm long, 2-2.5 mm wide at base, greenish outside, glabrous; tube greenish to cream inside, segments with copious dark purple or brown dots or entirely purple, glabrous or with copious dark purple hairs. *Corona* inserted c. 1 mm above base of staminal column, gamophyllous, widely cupular-truncate, 0.75 mm high, 2.5 mm wide, yellowish with dark-purple upper margin; divided into compartments by 5 epistaminal septa; upper margin of corona between septa with horizontally patent to slightly oblique short white cilia. *Staminal tube* short, connectives incurved, apex truncate, yellow-cream. *Pollinia* erect, ovoid, slightly compressed, pellucid margined on top inside edge, c. 0.27 mm long, 0.16 mm wide. *Caudicles* yellowish 0.09 mm long. *Translators* brown, 0.16 mm long. *Stigma* conical-convex, yellowish. *Follicles* fusiform, erect, narrowly linear-lanceolate, acute, terete, smooth, glabrous, 6-12 cm long, 2-3 mm wide. *Seeds* brown, to 8 mm long, coma 2-2.5 cm long. Figures 1-3.

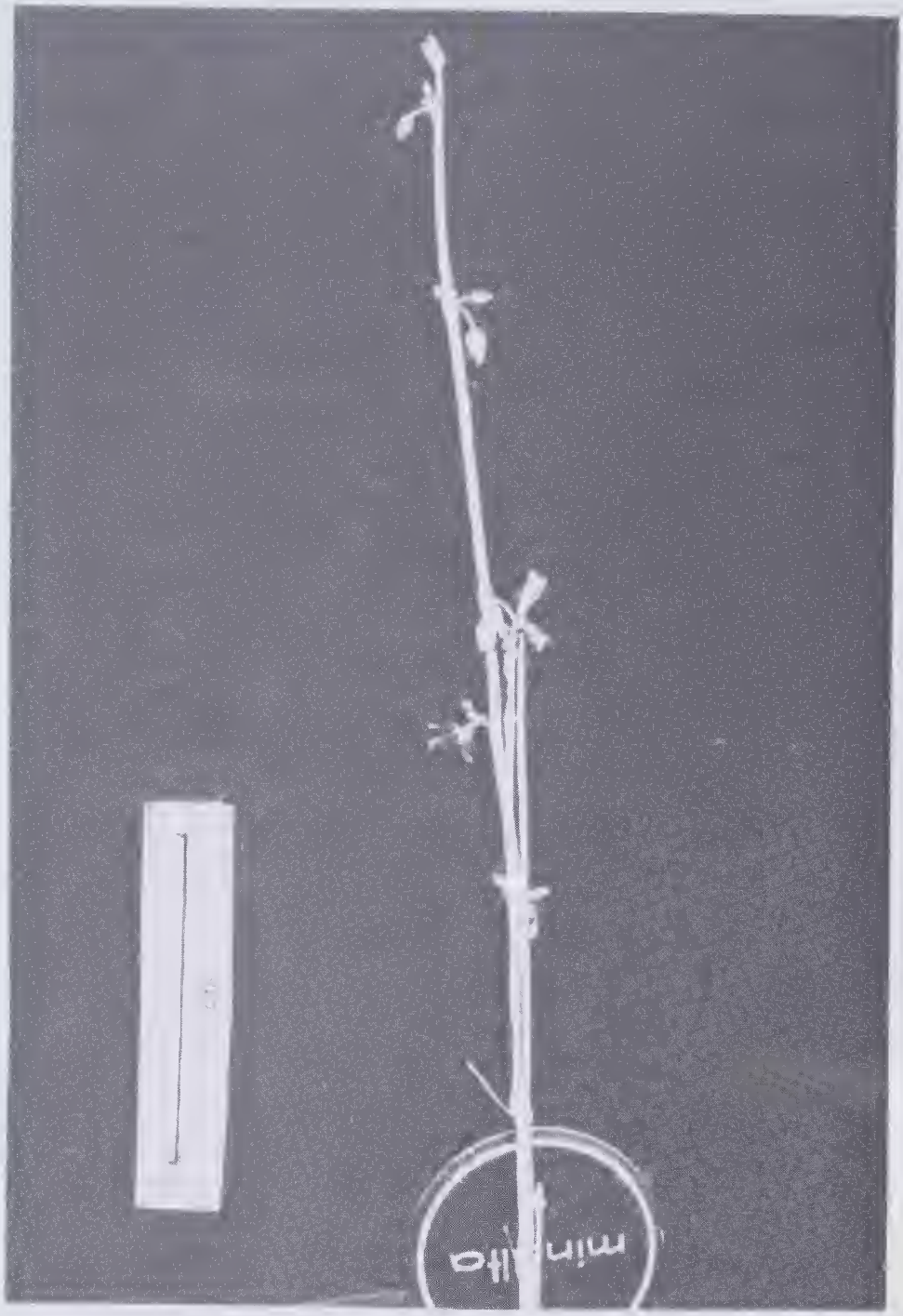


Figure 1. Flowering plant of *B. microstemma* (*M. Lockyer* sub *P.I. Forster* 1570), showing pendulous flowers and linear, vestigial leaves.

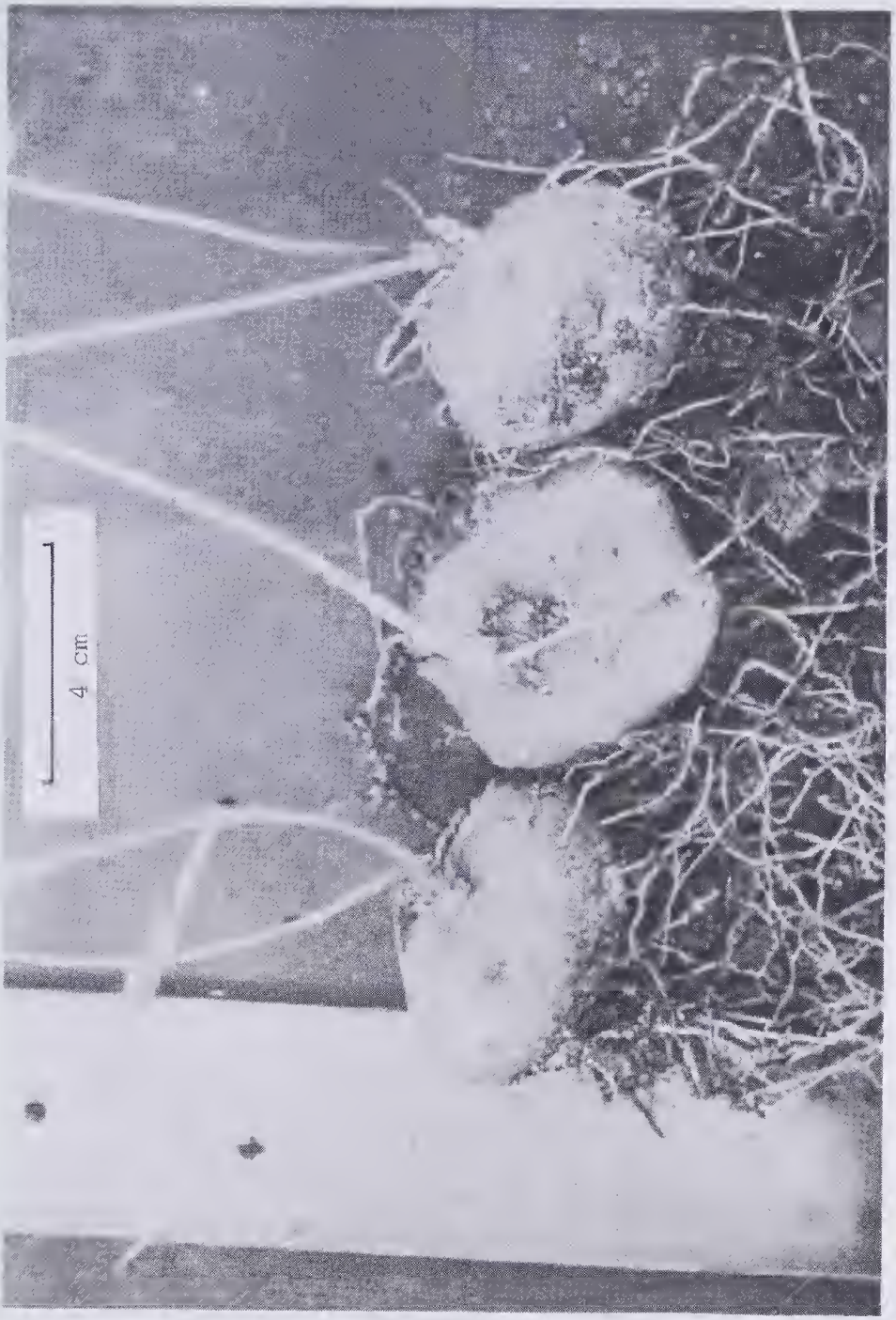


Figure 2. Tubers and linear-lanceolate leaves (arrowed) of *B. microstemma* (*R. Lockyer* sub *P.I. Forster* 1768). Scale = 20 mm.

Other specimens examined. PAPUA NEW GUINEA: Penzara, between Morehead & Wassi Kussa Rivers, *L.J. Brass* 8466 (BRI,L); vicinity of Kajabit Mission, *M.S. Clemens* 10735 (BRI).

INDONESIA: K1, Soenda Eil Flores, Matawae-Mburak, Paku, *E. Schmutz* 1870 (L).

AUSTRALIA, NORTHERN TERRITORY: Darwin & Gulf District: "North Australia", 1886, *J.E. Tenison-Woods & M. Holtze* s.n. [MEL1537655] (MEL); Port Darwin, Jan. 1883, *M. Holtze* s.n. [MEL1537647] (MEL); Port Darwin, 1882, *P. Foelsche* s.n. [MEL1537650] (MEL); Port Darwin, *Schulze* s.n. [sub. 6/1870 *Schomburgh*] (K); Port Darwin, *Schulze* s.n. [sub. 3/1870 *Schomburgh*] (K); Port Essington, *M. Holtze* 472 (MEL); Albridge River, 1886, *A. Cooke* s.n. [MEL1537648] (MEL); Port Keats, Sept. 1972, *C.S. Robinson* s.n. [DNA5128] (DNA); D. & G. Peron Island, *T.S. Henshall* 863 (DNA); Fenton Airstrip, *J. Must* 1283 (DNA); 14 miles (22.5 km) from Darwin on Stuart Hwy, *D.J. Morgan* 14 (DNA); Yirrkala—Nhulunbuy road, *N. Scarlett* NSY-254-74 (BRI); Arnhem Bay, central NE Arnhem Land, Dec. 1967, *N. Peterson* s.n. [NSW168641] (NSW); Nangalaa near the Raminginin turnoff, *H. Reeve* 410 (CANB); cultivated plant ex N.T., Feb. 1908, *A.E. Martin & R.S. Rogers* s.n. [NSW168640] (NSW).

QUEENSLAND: Cook District: Trinity Bay, 1893, *J.M. Birch* s.n. [MEL1537649] (MEL); Gilbert River, s. dat., *Anonymous* [MEL1537652] (MEL); Silver Plains—Goanna Creek road, *L.J. Webb* 3115 (BRI); 23.5 km ENE of Weipa Mission, *R.L. Specht & R.B. Salt* W204 (BRI); Princess Charlotte Bay, s. dat., *R.E. Roth* s.n. (BRI); Walsh, 1891, *J. Barclay-Millar* s.n. (BRI); Weipa, Fauna Survey Site 17, *A. Morton* 1599 (BRI); Beagle Airstrip, Aurukun Associates Lease, N of Aurukun, *A. Morton* 1588 (BRI); Badu Island, *J.R. Clarkson* 4011 (BRI, QRS, K, PERTH); Burke District: Mornington Island, Dec. 1979, *A. Moon* s.n. [BRI251693] (BRI). North Kennedy District: Herbert River, 1893, *J.M. Birch* s.n. [MEL1537649] (MEL); Herbert River, 1893, *Anonymous* [MEL1537653] (MEL); Near Mt Woodhouse, SW of Ayr, *S.T. Blake* 18658 (BRI); Scrubby Creek, c. 65 km WSW of Townsville, *M. Lockyer* sub *P.I. Forster* 1570 (BRI); 1 km N of the Kennedy Highway before crossing over Wild River, 22km W of Ravenshoe, *R. Lockyer* sub *P.I. Forster* 1768 (BRI).

WESTERN AUSTRALIA: Gardner District: NE of Kalumburu Mission, *H.F. Broadbent* 494 (PERTH); Swimming Hole, Camp Creek, 2 km S of mining campsite, Mitchell Plateau, N Kimberley, *K.F. Kenneally* 8690 (PERTH); Trial Mining site, 21 km N of Mining Campsite, Mitchell Plateau, N Kimberley, *K.F. Kenneally* 8660 (PERTH); s. loc., s. dat., *Anonymous* [MEL537654] (MEL).

Distribution. Widely distributed in north tropical Australia, with potentially a wide range in Papua New Guinea and Indonesia (Map).

Flowering period. Sporadic throughout year.

Habitat. The recurring habitat type recorded is in seasonally waterlogged ground amongst grass, often near creeks, under eucalypt woodland.

Affinities. B. microstemma appears to be a distinct, somewhat variable species and is unlikely to be confused with other members of the genus. There are some superficial similarities in the flower appearance with southern African species such as *B. tuberosum* (Meerb.) R. Br. ex Sims and *B. decipiens* N.E. Br. (Dyer 1980, 1983; Forster 1986). The greatly reduced corona in *B. microstemma* is distinctive, but similar coronas occur in *B. oianthum* Schltr., *B. decipiens* and *B. caffrum* (Schltr.) N.E. Br. (cf. Dyer 1980, 1983).

The distinctive vestigial scale leaves of *B. microstemma* do not apparently have counterparts among other species of the genus, but linear-lanceolate leaves are quite common (Figures 1 & 2).

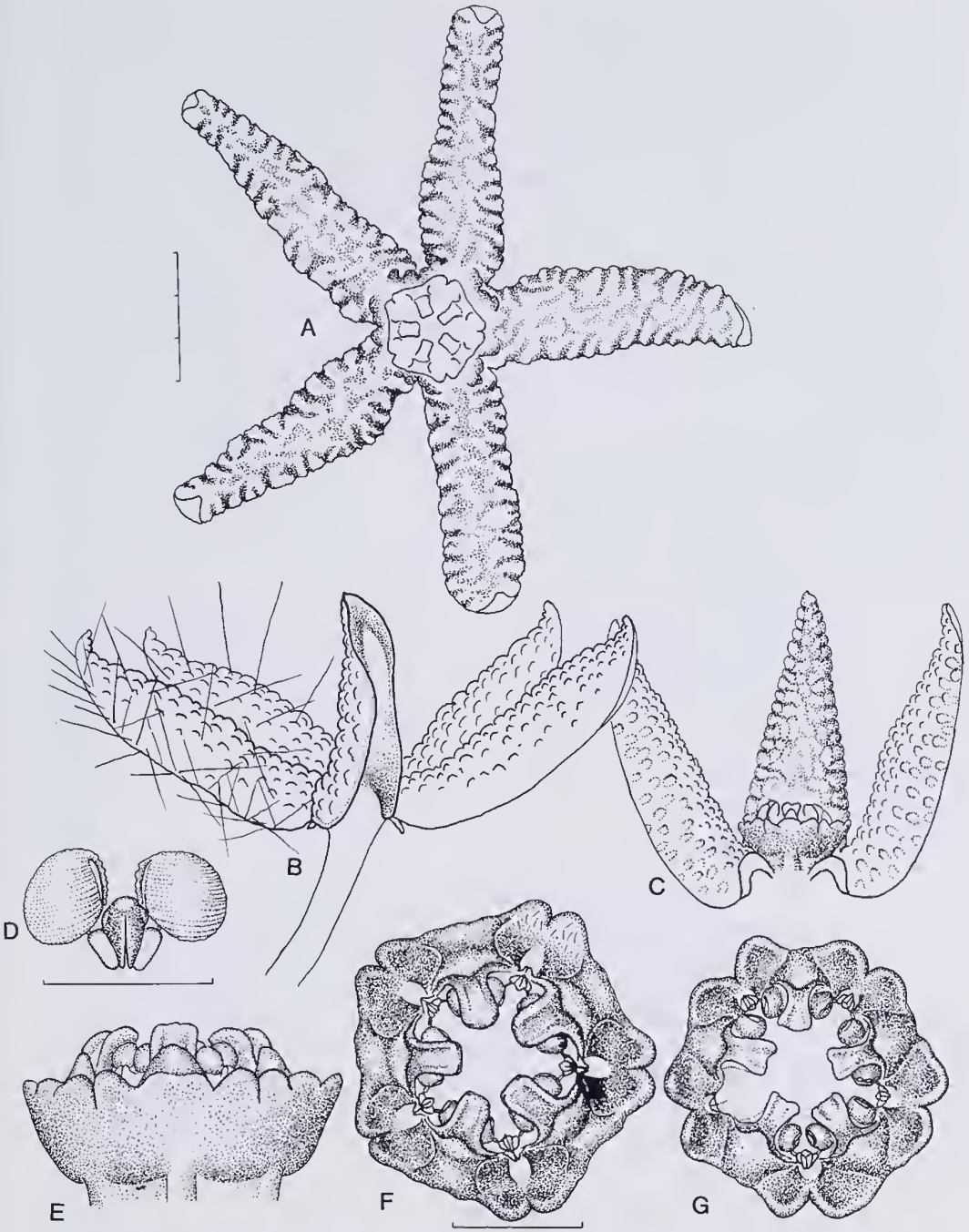
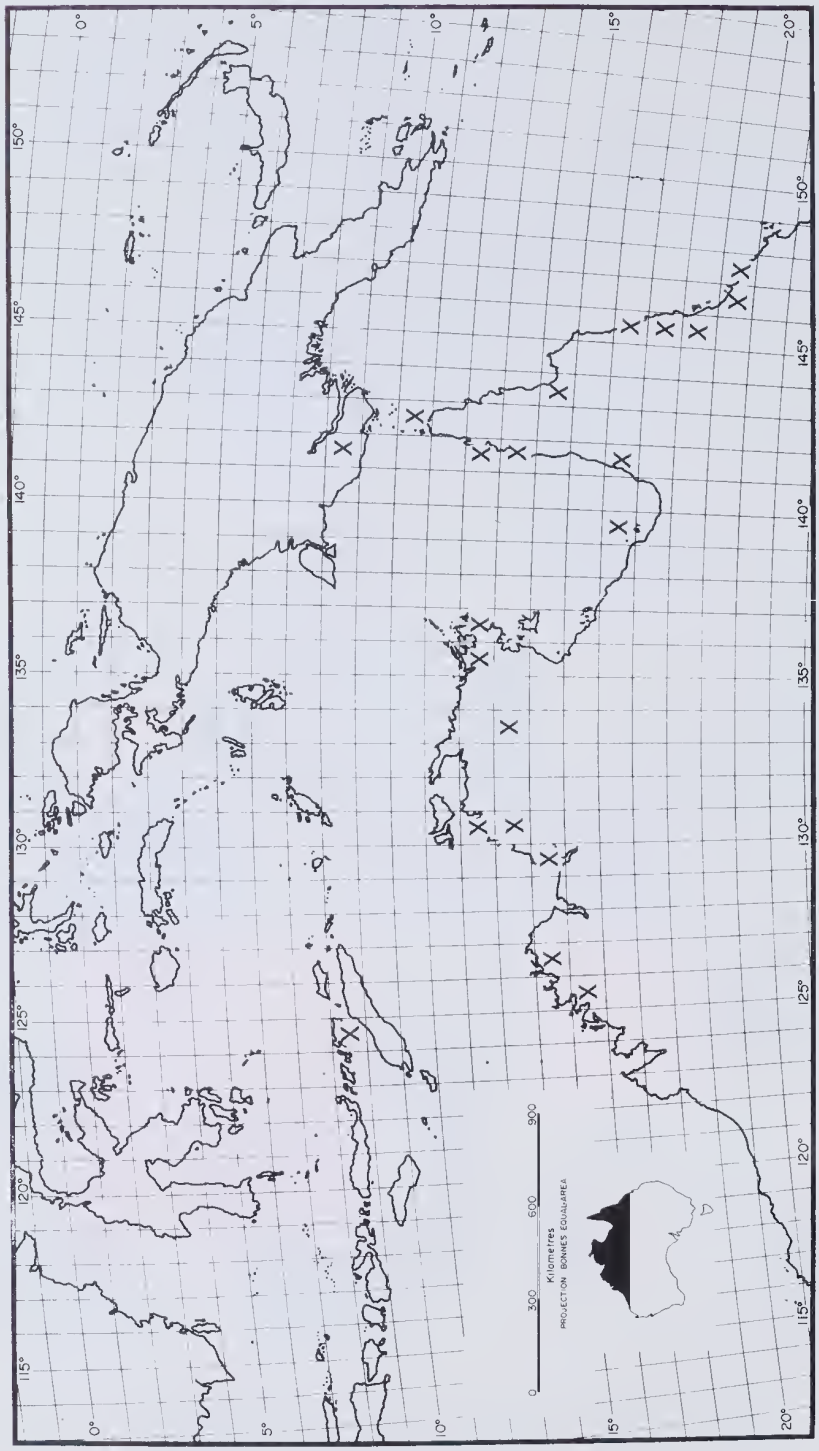


Figure 3. A—flower, apical view (hairs on corolla not shown). B—flower, side view (with hairs on corolla shown). C—transverse section of flower showing staminal column (A-C, scale = 3 mm). D—pollinarium (scale = 0.5 mm). E—side view of staminal column. F-G—apical view of staminal columns. Arrow indicates hairs on inner face of outer corona which are present on all lobes. (E-G, scale = 1 mm). A-F from *M. Lockyer* sub *P.I. Forster* 1570, G from *R. Lockyer* sub *P.I. Forster* 1768.
Drawings by P.V. Bruyns.



Map 1. Distribution map of *Brachystelma microstemma* in Australia and New Guinea.

Notes. Flower coloration and the presence or absence of hairs is variable, with the former dependent on flower age and the light of viewing. Herbarium records list flower colour as brown (*T.S. Henshall* 863) or purple (*A. Moon* s.n.). While most flowers are pilose, the corolla of *R.L. Specht* & *R.B. Salt* W204 is glabrous. In live material examined, the inner corolla was cream with purple spots with long purple hairs (*M. Lockyer* sub *P.I. Forster* 1570) or cream with brown spots and glabrous (*R. Lockyer* sub *P.I. Forster* 1768). Material from Java referred to this species (Backer & van der Brink Bakhuizen 1965) was described as having a greenish corolla deeply beset with dark purple dots. Hence the recognition of *M. glabriflorum* by Mueller (1858) is unwarranted.

B. papuanum was considered closest to *B. microstemma* and less so to *B. glabriflorum* (Schlechter 1914). It was distinguished from *B. microstemma* by the much taller growth (50-80 cm) and the much longer pedicel (17-20 mm). The flower colour was dark violet with golden yellow anthers. From Schlechter's illustration I can distinguish no floral characters significantly different to those from Australian material of *B. microstemma*. The maximum stem length observed in cultivated material of *R. Lockyer* in *P.I. Forster* 1768 was 85 cm and from wild collected material, 77 cm for *D.J. Morgan* 14. Pedicel length varies from 7-14 mm.

Pedicel length by itself is too minor a character on which to maintain a species, and in the absence of any other distinguishing characters, *B. papuanum* must be considered a synonym of *B. microstemma*.

In describing *B. merrillii* Schltr., Schlechter (1915) stated "This species is nearly allied to the Papuan *B. papuanum* Schltr. and the Australian *B. microstemma* Schltr. especially to the former, from which it is distinguished by shorter growth and the quite glabrous corona as well as by the form of the pollinarium. In all these three species the corolla is dark brownish-purple in colour." Enquiries to the Philippines Herbarium revealed that the material of this species there was destroyed during the Second World War and that it has not been recollected. From the original description it is probably conspecific with *B. microstemma*.

Conservation Status. The species cannot be considered endangered or threatened in any way at this stage. Ethnobotanical use in Australia has been outlined by Forster (1987).

Acknowledgements

I would like to thank Dr P.V. Bruyns, University of Cape Town for Figure 3. and for helpful comments on an early draft of the manuscript: Mr H. Dierich for translating Schlechter (1914); Mr N.S. Lander (PERTH) who, whilst Australian Botanical Liaison Officer at Kew, examined and organised photographs of type material at K and BM; Messrs R. & M. Lockyer for plants and much useful information; Mr L. Pedley (BRI) for discussion of various aspects of this work and for arranging loans of material from other herbaria; and the Directors of BRI, CANB, DNA, K, L, MEL, NSW and PERTH for access to collections either at their institutions or on loan.

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The Preiss Collection of Western Australian Fungi

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Abstract

Hilton, R. N. The Preiss Collection of Western Australian Fungi. Nuytsia 6(3): 295-304 (1988). The 41 specimens of different fungi collected by Ludwig Preiss between 1839 and 1841 are considered in the light of modern knowledge. They are arranged in order of Lehmann's numbers. Twenty-three of the specimens were described by Fries as new, of which type material of only one is extant. It is postulated that of the other 22 types the majority would have proved to be synonymous with Berkeley's previously published names: suggestions as to the identity of many of these are given. Of the 18 fungi identified by Fries as belonging to species already described from Europe, 11 have been re-collected.

Introduction

With the exception of two collections (2663 and 2677) specified as 1839, Preiss' collection of fungi was made in 1841. It thus represents the earliest collection of fungi made in Western Australia, pre-dating that of James Drummond by two years. However, the results of Drummond's collecting were published by M.J. Berkeley (1845), ahead of Fries' account of the Preiss specimens in 1846. It must be assumed that Fries was not aware of Berkeley's publication.

The Preiss collection of plants (including fungi and lichens) was distributed between a number of European botanical institutes (Candolle 1880; McGillvray 1975) with the cryptogams being included in the Berlin herbarium, destroyed during the 1939-45 war. The Preiss collection was not amongst those saved (Friederichsen pers. comm.; Hiepko 1978).

When the first Census of Western Australian larger fungi was being prepared (Hilton 1982) it was necessary to take into account the Preiss collections, at least so far as new species were concerned. My correspondence with European herbaria (see Acknowledgements) indicates that all the Preiss fungi must have been destroyed, with the exception of specimen No. 2682 at Uppsala (Santesson pers. comm.). The present publication records the basis on which the Preiss records were included in the Census, and gives botanical information from Fries' descriptions.

Ludwig Preiss was collecting in Western Australia from 1839 to 1841, arriving December 1838 and departing 8 January 1842 (Hasluck 1955; McGillivray 1975). He made 52 collections of fungi and lichens during this time. These were considered by Fries in the fungal section of Lehmann's "Plantae Preissianae" (1846). Fries described 23 of the 52 as new species of fungi, appearing again in Saccardo's "Sylloge Fungorum" (1882) with a grammatically corrected Latin description, in eight cases in new combinations. All of these new species were recorded in the Census of Western Australian larger fungi (Hilton 1982). The remaining 29 collections were omitted from the Census: two were duplicates of new species, nine were lichens, and 18 were known European species unsupported by citable specimens. Nevertheless, 11 of the 18 European species are supported by later collections and appear in the Census.

In the list that follows, a translation is given of Fries' Latin version of Preiss' notes on substrate, locality, and date of collection. English translations of all but 3 of Fries' descriptions are given by Cooke (1892) who omits *Stereum* No. 2686, 2687 and *Peziza melanodon* s.n. The *Stereum* species are listed by McAlpine (1895).

The following notes give comments on each record and a suggestion as to its identity, based on Fries' (1846) description. The Census referred to is that of Hilton (1982).

2663 *Agaricus (Lepiota) australius* Fr. in Lehmann, Pl. Preiss. 2: 131 (1846)

In sandy places of the woods on Mt Eliza, June 1839.

Notes: Fries records this as having the habit of *Lepiota procera* but with the pileus viscid. *Lepiota konradii* is the only local species of *Lepiota* that fits, but it does not have a viscid cap. It is in the Census as *Lepiota australiana* (Fr.) Sacc.

2664 *Agaricus (Pholiota) eriogenus* Fr. in Lehmann, Pl. Preiss. 2: 132 (1846)

On logs.

Notes: Cleland (1934 p. 104) tentatively ascribes a South Australian collection to this species on the basis of Preiss' and Cooke's description. It is in the Census as *Pholiota eriogena* (Fr.) Sacc. Following examination of the holotype of *Pholiota drummondii* (Berk.) Pegler at Kew, *P. eriogena* is concluded to be a later synonym of that species, not recollected until 1985 (Herb. UWA 3321).

2665 *Agaricus (Amanita) preissii* Fr. in Lehmann Pl. Preiss. 2: 131 (1846)

In shady sandy places of the woods, May.

Notes: A full description from a topotype is given by Bas (1969 p. 536). The name *Amanita preissii* (Fr.) Sacc. is used in the Census.

2666 *Agaricus (Pleurotus) eucalyptorum* Fr., in Lehmann, Pl. Preiss. 2: 131 (1846)

On *Eucalyptus* bark, July 1841.

Notes: The woolly bay-brown surface, and habitat on *Eucalyptus* bark, would fit *Lentinellus hepatotrichus* (Berk.) Reid. It is in the Census as *Pleurotus eucalyptorum* (Fr.) Sacc.

2667 *Agaricus (Psalliota) semiglobatus* Fr., Epicr. 220 (1838)

On horse manure.

Notes: The species is a well-known dung fungus of the State, now *Stropharia semiglobata* (Fr.) Sacc.

2668 *Agaricus (Psilocybe) ericaeus* Pers.: Fr., Epicr. 228 (1838)

On wet ground.

Notes: This species has been re-collected and appears in the Census as *Naematoloma ericaeum* (Fr.) Kühner, correctly *N. ericaeum* (Fr.) Singer.

2669 *Lentinus dealbatus* Fr. in Lehmann Pl.Preiss.2: 133 (1846)

On rotten logs, near Kelmsedth (*sic*). July 1841.

Notes: The locality is likely to be Kelmscott. Following examination of the holotype of *Lentinus fasciatus* Berk. (Pegler 1983 p. 165), *Lentinus dealbatus* is concluded to be a later synonym of that species.

2670 *Lentinus cochleatus* Fr., Hymen. Eur. 484 (1874)

On logs in New Holland.

Notes: This species has been re-collected and appears in the Census as *Lentinellus* P. Karst., the classification accepted by Pegler (1983 p. 226).

2671 *Panus cinnabarinus* Fr. in Lehmann Pl. Preiss. 2: 133 (1846)

In the foothills of the Darling Range near Kelmstedt (*sic*) at the base of trunks; and also on the withered leaves of monocotyledons. July 1841.

Notes: The locality is likely to be Kelmscott. It is listed in Pegler (1983 p. 226) as an excluded *Lentinus* species.

2672-2675 Lichens

2676 *Schizophyllum commune* Fr., Syst. mycol. 1: 330 (1821)

On the bark of dying logs, June 1841.

Notes: A well-known fungus of which the identity is not in doubt.

2677 *Boletus infractus* Fr. in Lehmann, Pl. Preiss, 2: 134 (1846)

On the ground, May 1839.

Notes: The description is inadequate for matching with modern collections of *Boletus* Fr., many of which have yet to be described.

2678-2679 *Boletus caesareus* Fr. in Lehmann, Pl. Preiss. 2: 134 (1846)

Perth Town in sandy soil.

Notes: The description matches the as yet unnamed collection UWA 3384 (R. Watling pers. comm.) of which several other collections have been made.

2680 *Boletus arenarius* Fr. in Lehmann, Pl. Preiss. 2: 134 (1846)

The "Gnucho" of the Aborigines. On sandy soil by the River Swan.

Notes: As for 2677. A number of boletes were eaten by the Aborigines, and "ngutjo" is a known general name for them (Bindon, pers. comm. 1985).

2681 *Polyporus (Apus) eucalyptorum* Fr. in Lehmann, Pl. Preiss. 2: 135 (1846)

The "Medop" of the New Holland Aborigines. On *Eucalyptus* trunks.

Notes: The description fits *Polyporus portentosus* Berk. This is *Piptoporus portentosus* (Berk.) G.H. Cunn. under which it is put in the Census. The dried flesh is a highly effective tinder (amadou) (Bindon, pers. comm. 1985) which may have been the white fungus material carried by Aboriginal women (Grey 1841, II p. 266). As *Polyporus portentosus* represents the earlier name, *P. eucalyptorum* is reduced in synonymy.

2682 *Polyporus (Mesopus) bulbipes* Fr. in Lehmann, Pl. Preiss. 2: 135 (1846)

On the ground.

Notes: Recombination (as *Polystictus*) in Sacc., Syll. Fung. 6: 211 (1887), In the herbarium at Uppsala (Santesson, pers. comm. 1972), and by synonymy traceable to *Polystictus oblectans* (Berk.) Sacc. now recognised by Ryvarden & Johansen (1980 p. 105) as the European species *Coltricia cinnamomea* (Pers.) Murrill.

2683 *Polyporus (Apus) fulvus* Scop.: Fr., Epicr. 466 (1836)

On the trunks of trees. The extremely long-lived specimen stands out along with the common form collected on a species of *Eucalyptus* (White Gum in English), receding, with pileus pulvinate to ungulate blackish, very cracked and broken up.

Notes: White Gum is *Eucalyptus wandoo* Blakely. *P. fulvus* is *Phellinus pomaceus* (Pers.) R. Maire (Bondartsev 1953 p. 359), a European species for which the common *Phellinus rimosus* (Berk.) Pilát can easily be mistaken, and under which name it appears in the Census.

2684 *Polyporus (Apus) sanguineus* Meyer: Fr., Syst. mycol. 1: 371 (1821)

In shady woods on rotten wood especially of *Melaleuca papyracea.*

Notes: *Pycnoporus. As Pycnoporus sanguineus* (Fr.) Murr. is a tropical species (Bondartsev 1953 p. 475; Nobles & Frew 1962), this record was taken in the Census to represent the Southern Hemisphere temperate species *Pycnoporus coccineus* (Fr.) Bond. & Singer.

2685 *Polyporus (Resupinatus) parilis* Fr. in Lehmann, Pl. Preiss. 2: 136 (1846)

On bark.

Notes: A number of yellow species of *Poria* or resupinate polypores fit the description. It appears in the Census as *Poria parilis* (Fr.) Sacc.

2686 *Stereum (Apus) umbrinum* Fr. in Lehmann, Pl. Preiss. 2: 137 (1846)

On bark of *Banksia menziesii.* July 1841.

Notes: Omitted by Cooke (1892), but included by McAlpine (1895 p. 66).

2687 *Stereum (Apus) vittaeforme* Fr. in Lehmann, Pl. Preiss. 2: 137 (1846)

On the bark of *Acacia*, Blank-Wattle (*sic*) in English. July 1841.

Notes: Omitted by Cooke (1892), but included by McAlpine (1895 p. 66). Blank-Wattle is presumably Black Wattle, perhaps *Acacia saligna*. The epithet "*vittiforme*" in the Census is an orthographic correction.

2688 *Thelephora (Mesopus) concrescens* Fr. in Lehmann, Pl. Preiss. 2: 136 (1846)

In hidden wet places on the bank of the Canning River over old wood.

Notes: Cunningham (1963 p. 335) states that no type is known. From the description *Tremelloscypha australiensis* Reid has a strong similarity.

2689 *Thelephora (Merisma) myriomera* Fr. in Lehmann, Pl. Preiss, 2: 137 (1846)

On land at the same place as the above (i.e. 2688).

Notes: Cunningham (1963 p. 337) states that the type no longer exists. From the description *Tremelloscypha australiensis* Reid has a strong similarity.

2690 *Clavaria (Ramaria) plebeia* Fr. in Lehmann, Pl. Preiss, 2: 137 (1846)

In sandy places, 8 June 1839.

Notes: It is unlikely that Preiss would have failed to collect one of the common Jarrah Forest ramarias, for example *Ramaria ochraceo-salmonicolor* (Cleland) Corner, which starts white and tough as described for this species. A recombination in *Ramaria* has not been made either by Saccardo or any other worker.

2691 *Peziza (Humaria) ollaris* Fr., Syst. mycol. 2: 68 (1822)

In forest clearings near to Lake Daujamlur (*sic*), 16 July 1839.

Notes: The locality might be Lake Joondalup; maps dating from the time give no clue. No reference later than Saccardo (1882) can be found for this species, even from Northern Hemisphere literature. It is in the Census as *Humaria ollaris* (Fr.) Sacc.

2692 *Lycoperdon pusillum* Fr., Syst. mycol. 3: 53 (1829)

In somewhat muddy shaded areas and low-lying places, flooded in winter, sandy below, June 1841.

Notes: The species was collected by Drummond under the synonym *Lycoperdon gemmatum* Batsch. (Hilton 1983), and also appears in the Census as *Lycoperdon pusillum* Pers. from later collections.

2693 *Nidularia crucibulum* Fr., Syst. mycol. 2: 29 (1822)

On friable bark of *Eucalyptus*, White Gum in English, near Kelmsedth (*sic*) on the Canning River, June 1841.

Notes: White Gum is *Eucalyptus wandoo* and the locality is likely to be Kelmscott. The species has been re-collected many times under its current name, *Crucibulum laeve* (Huds.) Kambly.

2694 *Colus* (as "*Coleus*") *hirudinosus* Lév., Annal. Sc. Nat. 3: 252 (1835)

In clearings around the small town of Perth, June 1841.

Notes: The Census errs in indicating this as a type and also in assuming it to have been *Clathrus pusillus* Berk. The only collection under this name prior to publications of the Census was in fact *Clathrus pusillus* (Cunningham 1944 p. 109). Subsequently the species *Colus hirudinosus* has been re-collected (Herb. UWA 3378).

2695 *Geaster pusillus* Fr. in Lehmann, Pl. Preiss. 2: 139 (1846)

In sandy soil by the Canning River. June 1841. Very rare.

Notes: = *Geastrum pusillum*. The description fits several of the common species of *Geastrum* Pers..

2696-2700 Lichens. Listed in Lehmann's index, p. 428.

2701-2702 *Favolus discolor* Fr. in Lehmann, Pl. Preiss, 2: 136 (1846)

On the bark of trees.

Notes: Subsequently placed by Fries in *Hexagonia* Fr. It appears in the Census as *H. discolor* (Fr.) Fr.

2703 *Agaricus (Pholiota) praecox* Pers.: Fr., Epicr. 162 (1836)

On the ground.

Notes: In the Census as *Pholiota praecox* (Pers.: Fr.) Sacc., without a citable collection. A well-known European species, *Agrocybe praecox* (Pers.: Fr.), Fayod, which has not yet been re-collected.

2704 *Polysaccum degenerans* Fr. in Lehmann, Pl. Preiss. 2: 139 (1846)

In sandy places by the Swan River around the small town of Perth. Along with *Scleroderma geaster*. Collected by Preiss m. June 1841.

Notes: The Census errs in not listing it as a new species, but the description is clearly of *Pisolithus tinctorius* (Mich.: Pers.) Coker & Couch.

s.n. *Agaricus (Collybia) lepidopus* Fr. in Lehmann, Pl. Preiss. 2: 131 (1846)

Notes: The description is from Preiss' drawing only. It appears in the Census as *Collybia lepidopoda* (Fr.) Sacc.

s.n. *Agaricus (Pleurotus) spongiosus* Fr., Epicr. 130 (1836)

On rotten wood on low-lying sandy soils.

Notes: Fries identified this from Preiss's drawing only. It is not included in the Census or in Cooke (1892).

s.n. *Agaricus (Flammula) peregrinus* Fr., Epicr. 191 (1836)

The drawing made by Preiss referred to here; no information about the specimen.

Notes: Fries identified this from Preiss's drawing only. It is not included in the Census but is listed by Cooke (1892 p. 51).

s.n. *Agaricus (Psilocybe) atrorufus* Schaeff.: Fr., Syst. mycol. 1: 293 (1821)

From Preiss' drawing without manifest difference from that of Europe.

Notes: Fries identified this from Preiss's drawing only. It was included in the Census as *Psilocybe atrorufa* (Schaeff. : Fr.) Quēl. but should not have been in the absence of a later collection.

s.n. *Boletus subsimilis* Preiss: Fr. in Lehmann, Pl. Preiss. 2: 134 (1846)

Collected in May.

Notes: This is not supported by a drawing or numbered specimen, but with a Latin description by Preiss himself. It was accepted by Fries as a valid new species and is therefore included in the Census. Preiss comments that it is somewhat similar to *Boletus lividus* Fr., a species now placed in the genus *Gyrodon* Opat. and not found in Australia.

s.n. *Polyporus (Apus) hispidus* Fr., Syst. mycol. 1: 362 (1821)

On the bark of *Eucalyptus* (Mahagang (*sic*) in English) July 1841. Very rare.

Notes: Mahagang is Mahogany, i.e. Jarrah. This fungus appears to have been identified by Preiss but is unlikely to have been this well-known Northern Hemisphere species of *Inonotus* P. Karst.which has not otherwise been recorded for Australia. It is more likely to have been *Tyromyces pelliculosus* (Berk.) G.H. Cunn., the Furry Punk, a species recorded on Jarrah from Western Australia and included in the Census as *Polyporus pelliculosus* Berk.

s.n. *Tremella lutescens* Pers.: Fr., Syst. mycol. 2: 213 (1822)

On bark. Preiss Herbarium without number.

Notes: Identified by Preiss. This is the common bright yellow Jelly Fungus, in the Census as *Tremella mesenterica* Retzius : Fr., of which *T. lutescens* is a synonym, following McNabb (1966 p. 536).

s.n. *Peziza (Geopyxis)* sp.

In sandy places of low-lying ground, July 1841.

Notes: Not included in the Census. This could be one of many species of *Peziza* Dill. or *Geopyxis* (Pers.) Sacc.

s.n. *Peziza (Humaria) melanodon* Fr. in Lehmann, Pl. Preiss, 2: 138

In sandy soil of the woods on the left bank of the Canning River, after rains.

Notes: Omitted by both Cooke (1892) and McAlpine (1895). This was accepted by Fries as a new species from Preiss' drawing and description only, and is therefore included in the Census as *Humaria melanodon* (Fr.) Sacc.

s.n. *Scleroderma geaster* Fr., Syst. mycol. 3:46 (1829)

In sandy places by the Swan River collected by Preiss at the same place and time as the above (i.e. 2692).

Notes: Included in the Census on the basis of a subsequent collection.

Conclusion

Despite the brief descriptions that omit spore details and other features regarded as essential for modern diagnosis, most of the 41 different fungi collected can be recognised as known Western Australian species. The one Preiss herbarium specimen that survives represents the common species *Coltricia cinnamomea* (Pers.) Murrill, also collected by Drummond. Those that have been lost appear to have been of other species common today. The twelve unnumbered records appear not to have been supported by specimens in the first place. Because of the priority of the Berkeley names, most of the 23 new names published by Fries would have been reduced to synonymy.

Acknowledgements

I am indebted to Drs R. Santesson, J. Friederickson, and P. Lassen for confirming that no Preiss fungi are amongst the collections of Preiss material at Uppsala, Hamburg, and Lund respectively. Also to Dr Mark Seaward for checking during his visit to the herbarium at Wroclau (Poland).

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Index to Names

The genus *Pavonia* Cav. (Malvaceae: Malvavisceae) in Australia

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Abstract

Fryxell, Paul A. The genus *Pavonia* Cav. (Malvaceae: Malvavisceae) in Australia. Nuytsia 6(3): 305-308 (1988). *Pavonia* is a large and diverse tropical genus but is poorly represented in Australia. *P. hastata* was probably an early introduction from South America. *Pavonia burchellii* is reported for the first time from Australia, being previously known from Africa, Asia, and Malesia, and an account of its complex synonymy is presented. A key to distinguish *P. hastata* and *P. burchellii* is given. The occurrence of the African *P. praemorsa* in garden cultivation in Australia is incidentally noted.

Introduction

Pavonia is one of the larger genera of the family Malvaceae. It includes over 100 species in South America (Kearney, 1958), about 50 species in North America (Kearney 1954, Fryxell 1979), and about 50 species in Africa (Ulbrich 1921). In addition there are a few species in southern Asia and in Malesia. The genus is poorly represented in Australia, and previous reports refer only to the occurrence of *P. hastata* Cav. in southeastern Australia. The present paper reports an additional species of *Pavonia* indigenous to the Kimberley region and a species cultivated as an ornamental shrub, and provides ancillary information about all three species known to occur in Australia.

Pavonia hastata Cav.

Pavonia hastata is a representative of sect. *Lebretonia* (cf. Krapovickas & Cristóbal 1962, Krapovickas 1977) and is perhaps the best known and most widely distributed representative of it. This section has its principal distribution and diversification (over 50 spp.) in South America. Although *Pavonia hastata* is primarily South American (Argentina, Uruguay, Paraguay, Bolivia, and Brazil), it also occurs disjunctly in Mexico (rarely), the southern United States (rarely), and in eastern Australia (commonly) and is generally considered introduced in these areas. It is sometimes grown as an ornamental.

In the Australian National Herbarium (CANB) among many collections of *P. hastata* there is a specimen collected by Robert Brown in 1802-1805, a scant 17 years after the settlement of Australia, a specimen that incidentally bears an unpublished binomial in Brown's hand. The citation is as follows:

NEW SOUTH WALES: Paterson's, Nepean and Hawkesbury rivers, near Sydney (Port Jackson), 1802-1805, *Robert Brown* s.n. (CANB).

In view of the existence of this specimen, it seems unlikely that *P. hastata* is a naturalized former cultigen. However, the possibility remains open (indeed likely) that it was introduced in ships ballast, or by some similar accidental means, very soon after settlement.

Pavonia burchellii (DC.) Dyer

A recent opportunity for botanical exploration in the Kimberley region of northwestern Australia resulted in the unexpected discovery of a *Pavonia* from one of the northernmost sites in this area, near the tip of the Bougainville Peninsula. Subsequent study reveals that it is the same species as that treated and illustrated by Borssum Waalkes (1966) as *Pavonia procumbens* (Wight & Arnott) Walpers. It thus bridges the gap across the Timor Sea from Malesia to Australia and constitutes a plausible range extension for the species, as well as a new record for Australia. The new record is as follows:

WESTERN AUSTRALIA: beach near NE end of Bougainville Peninsula [14°01'S, 126°00'E]; among basaltic boulders above high tide; spreading shrubs 0.5-1 m tall; flowers yellow-orange, the genitalia declined; common in shade, 14 June 1985, *Fryxell, Craven & Stewart* 4796 (BM, CANB, CTES, DNA, MO, PERTH, US, pf).

Pavonia burchellii and *P. hastata* may be distinguished by means of the following key:

A. Leaves narrowly hastate, 2.5-5 times as long as wide, stellate-puberulent or scabridulous (the hairs <0.1 mm); corolla pink or lavender with darker center; pedicels subequal to subtending leaves ..... *P. hastata*

A. Leaves broadly cordate-ovate, about as wide as long, often shallowly 3-lobed or 3-angled, stellate-pubescent (the hairs c. 0.5 mm); corolla yellow-orange; pedicels shorter than subtending leaves ..... *P. burchellii*

Additional study reveals that this species presents a rather complex and extensive synonymy and that a name other than that used by Borssum Waalkes is the correct name. Since this synonymy does not seem to have been presented previously in full, and since the species in question has an extended distribution around the Indian Ocean from southern Africa to Malesia and (now) Australia, and since it is known by different names in various floras (see Table 1), it seems desirable to record the details of the synonymy. The species is quite variable over this range, which accounts for the rich synonymy, but seems best to be interpreted as a single variable species.

Pavonia burchellii (DC.) Dyer, Kew Bull. 1932: 152 (1932). *Althaea burchellii* DC. Prodr. 1: 438 (1824). *Type*: Cape Province, *Burchell* 2557 (G-DC, as microfiche!).

Urena mollis R. Br. in Salt, Voy. App. 65 (1814), nom. nud. Based on: Abyssinia, in inferioni regione montis Scholoda, *Schimper* 364 (GH!); Chelicut, *Salt* s.n. (MO!).

Lebretonia procumbens Wight & Arn. Prodr. Fl. Pen. Ind. Orient. 1: 47 (1834). *Pavonia procumbens* (Wight & Arn.) Walp. Repert. Bot. Syst. 1: 301 ([Sep] 1842), non Casaretto ([Oct] 1842). *Type*: *Wallich* 2668 (lecto: K).

Lebretonia cernua Span. Linnaea 15: 168 (1841). *Pavonia cernua* (Span.) Walp. Repert. Bot. Syst. 2: 790 (1843). *Type*: Timor, *Spanoghe* s.n. (BO, K, L).

Pavonia kraussiana Hochst., Flora 27: 293 (1844). *Type*: inter arundines prope Il. Umlaes, Natal, *Krauss* 338 (specimen unknown).

Hibiscus kraussianus Buching ex Hochst. Flora 27: 293 (1844). *Pavonia kraussiana* (Buching ex Hochst.) Walp. Repert. Bot. Syst. 5: 90 (1845), non Hochst. (1844). *Type*: in sylvis primitivis prope fl. Kuysna, George, *Krauss* 1569 (specimen unknown).

Lebretonia glechomaefolia A. Rich. Tent. Fl. Abyss. 1: 54 (1847). *Pavonia glechomifolia* (A. Rich.) Garcke ex Schweinf. Beitr. Fl. Aethiop. 1: 54 (1867). *Type*: Abyssinia, in regione maritima Choho dicta, *Petit* s.n. (P).

Lebretonia acuminata A. Rich. Tent. Fl. Abyss. 1: 53, t. 13 (1847). *Type*: Abyssinia, prope Axum, *Schimper* 1498 (lecto: K! MO!).

Pavonia crenata Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 53 (1847), pro syn. (nom. nud.). Based on: *Schimper* 1498, 1910 (MO!).

Table 1. Species names for *Pavonia burchellii* accepted (X) or treated as synonyms (s) in various floristic works. Specific epithets are abbreviated by their first three letters (see text) and given with the date of publication of the basionym.

	pat 1809	bur 1824	pro 1834	cer 1841	kra 1844	gle 1847	acu 1847	cre 1847	mac 1894	lep 1913	cte 1921	mee 1921	cox 1926
Pr.Fl.Ind.Or. Wight, 1834			X										
Beitr. Fl. Aeth. Schweinf.1867						X	s	X					
Fl. Trop. Afr. Oliver, 1868			s			X	s	s	X				
Fl. Brit. Ind. Masters, 1872			s			X							
Fl. Capensis Harvey, 1894					s		s	s	X				
Afr. Pavonia Ulbrich, 1921			s		X	X	s	s	s	X	X	X	
Consp.Fl.Angol. Carrisso, 1937	X				s				s				
Con.Conh.Fl.Moc. Mendonca, 1950	X												
Fl.Angl.Egyp.Sud. Andrews, 1952		X							s				
Enum. Pl. Aeth. Cufodontis,1959		X			s		s		s				
Fl. Zambes. Meeuse, 1961	X	s	s		s	s			s	s			
Fl.Cong.Rw.Bur. Hauman, 1963		X			s	s			s				
Males. Malv. Borssum, 1966			X	s		s							s
Pr.Fl.SW Afr. Merxmuller,1969		X			s				s	s			
Fl. Swaziland Compton, 1976	X												
Fl. Iranica Riedl, 1976		X				s							
Fl.W.Pakistan Abedin, 1979		X	X	s		X							s
Fl. Mocambique Ex./Gonc. 1979	s	X											
Fl. Rwanda Troupin, 1983	X	s											

Pavonia macrophylla E. Meyer ex Harv. & Sond. Fl. Cap. 1: 169 (1894). *Pentameris macrophylla* E. Meyer in Drège, Zwei Pflanzengeogr. Dokum. 147, 160, 210 (1843), nom. nud. *Type*: Natal, *Drège* s.n. (specimen unknown).

Pavonia leptoclada Ulbr. Bot. Jahrb. Syst. 51: 60 (1913). *Lectotype*: Southwest Africa, Hereroland, Otjikango bei Okahandja, *Dinter* 527 (specimen unknown).

Pavonia ctenophora Ulbr. Bot. Jahrb. Syst. 57: 122 (1921). *Syntypes*: Sudan, Dar-Fur, Gebel Barkin Distr., Surutj, *Pfund* 245 (specimen unknown); Gebel Chusus von Dar-Fur, *Pfund* 247 (specimen unknown).

Pavonia meeboldii Ulbr. Bot. Jahrb. Syst. 57: 122 (1921). *Type*: Vorderindien, Madura, bei Bodinaikonur, *Meebold* 13558 (specimen unknown).

Pavonia coxii Tadulingham & Jacob, J. Ind. Bot. Soc. 5: 11 (1926). *Type*: India, Coimbatore, *Cox* 59B (K).

Borssum Waalkes (1966, p. 136) notes that although the name *Pavonia patens* (Andrews) Chiovenda has been applied to this species in several recent works (see Table 1), the basionym, *Sida patens* Andrews (1809) concerns a plant that is clearly not a *Pavonia* on the basis of the published plate and description; no type specimen for this name has been traced.

Pavonia praemorsa Willd.

This African species was recently found growing as a cultivated ornamental in a garden in Perth, Western Australia. Only a unicate collection was possible; the specimen is currently retained in the author's herbarium. The citation is as follows:

WESTERN AUSTRALIA: Como, South Perth, in garden of Windsor Lodge Motel; cultivated shrub 1-1.5 m; flowers yellow, drying reddish, 25 April 1983, *Fryxell* 3846 (pf).

There is no evidence that *P. praemorsa* occurs indigenously in the Australian flora.

Acknowledgements

I am grateful to Lyn Craven for directing my attention to the specimen collected by Robert Brown, and I am grateful to him and J. McD. Stewart for participation in joint field work—and for tolerating my enthusiasm for the discovery of *Pavonia* on the Bougainville Peninsula.

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New taxa and notes on *Banksia* L.f. (Proteaceae)

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Abstract

George, A.S. New taxa and notes on *Banksia* L.f. (Proteaceae). Nuytsia 6(3): 309-317 (1988). Several corrections of bibliographic data and orthography are given. New taxa described are *Banksia* series *Bauerinae*, *Banksia epica*, *B. oligantha*, *B. leptophylla* var. *melletica* and *B. spinulosa* var. *neoanglica*. A presumed natural hybrid in Western Australia is reported. Three further early names in *Banksia* are listed; none affects the accepted nomenclature. *Banksia plagiocarpa* has been rediscovered on the Queensland mainland.

Since the publication of my revision of the genus *Banksia* (George 1981) a number of developments have occurred to warrant a supplementary paper. The most remarkable is the discovery in 1984 of a new species of subgenus *Isostylis* R. Br. which previously contained only two species.

Several points of nomenclature and bibliography should be noted. First, the date of publication of Linnaeus' "Supplementum plantarum", in which *Banksia* was described, was April 1782, not October 1781 as given in my revision (Manitz 1976). The date of publication of the four species named by the younger Linnaeus (*B. serrata*, *B. integrifolia*, *B. ericifolia* and *B. dentata*) should be corrected also to 1782.

In accordance with a change adopted at the XIII International Botanical Congress in Sydney in August 1981, the specific epithet suffix *-eranus/a/um* should be *-erianus/a/um* (International Code of Botanical Nomenclature [Sydney Code], Art. 73, Rec. 73c(d), p.65). The Banksias that should be altered are *Banksia elderiana* F. Muell. & Tate and *B. hookeriana* Meissner.

Banksia littoralis R. Br. Var. *seminuda* A.S. George has been raised to specific rank by B.L. Rye (Nuytsia 5: 25, 1984), a change with which I agree.

A new series for *Banksia baueri* R. Br

In my revision (George 1981, pp. 312-313, 319) I considered *Banksia baueri* anomalous in the series *Quercinae* Meissner. I now believe that its distinguishing characters are sufficient for it to be placed in its own series, making a third monotypic series in *Banksia*. The awned perianth, unusual in the genus, tends to distract attention from the other characters of *B. baueri* that distinguish the species from the *Quercinae*. These are the ribbed pollen-presenter with a stigmatic groove, the acropetal floral development, the tomentose new vegetative shoots, the follicles that are beaked at the stylar point after dehiscence, and the seeds with a notched wing.

Banksia subg. **Banksia** sect. **Banksia** ser. **Bauerinae** A.S. George, series nova.

Frutices sine lignotuberis. Folia serrata, primo tomentosa. Inflorescentiae in ramulis lateralibus brevibus, raro terminales, late cylindricae. Perianthium limbo aristato. Pistillum infra apicem geniculatum; pollinis praebitor 2-4 mm longus, costatus, stigmate canaliculata. Folliculi post dehiscentiam cum rostro laterali. Semina ala lateraliter lobata. Cotyledones obovatae, parum crenulatae.

Typus: Banksia baueri R. Br.

In the systematic sequence in my revision the species may retain its position between series *Quercinae* s. str. and series *Orthostylis* (Benth.) A.S. George.

Banksia epica A.S. George, sp. nov. (series *Cyrtostylis*) (Figure 1).

Affinis *B. praemorsae* Andrews et *B. mediae* R. Br., a quibus perianthio majore et praebitore pollinis longiore praecipue differt.

Folia obovata ad anguste cuneata, 15–50 mm longa, marginibus planis vel leviter recurvis, breviter serratis. Perianthium 40–44 mm longum limbum 4.5–5.5 mm longum includens, infra glabrum, supra extus pubescens limbo glabro. Pistillum 39–49 mm longum, glabrum; praebitor pollinis 1.5–1.8 mm longus. Folliculi ubi exserti 13–20 mm longi, 7–10 mm alti, 6–9 mm lati, colliculati, parce hirsuti; flores veteres persistentes, stylibus curvatis.

Typus. Point Culver, Great Australian Bight, Western Australia, c. 32° 55' S, 124° 42' E, 6 May 1986, *J. Falconer* s.n. (holo: PERTH; iso: CANB, MEL).

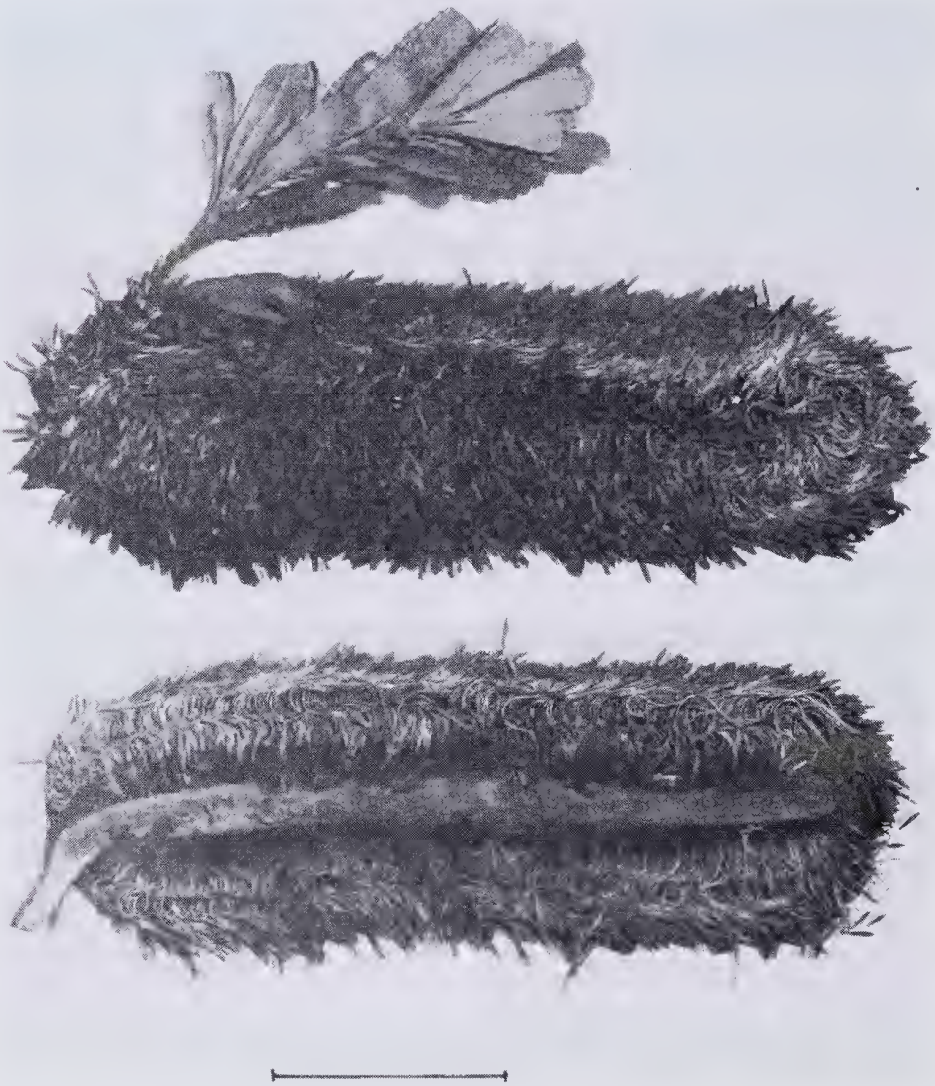

Figure 1. *Banksia epica* A. S. George—holotype. Bar scale is 5 cm.

Mature plant a *shrub* to 2 m, without lignotuber, much-branched and spreading. *Bark* not seen. *Branchlets* terete, closely hoary with fine grey curled hairs. *Leaves* obovate to narrowly cuneate, truncate, with an obtuse caducous mucro, 15–50 mm long including petiole of 2–8 mm, 6–15 mm wide; margins flat or very slightly recurved, shortly and obtusely serrate, sometimes almost entire; teeth to 1 mm long; upper surface ferruginous-tomentose becoming scurfy with short curled hairs; lower surface reticulate between main lateral nerves, the lacunae woolly; petiole closely hoary; new growth not seen. *Inflorescences* on short lateral branchlets from older branches; axis 9–17 cm long, 10–12 mm wide, 28–30 mm wide with common bracts, without flowers for 1–2 cm at base and often at apex. *Involucral bracts* not seen, fallen by mid-bud stage. *Common bracts* linear, 10–11 mm long, closely hirsute with pale brown hairs; exserted apex narrowly conical c. 1.8 mm long, acute, straight to slightly upturned, slightly scurfy at base, glabrous above, green. *Floral bracts* similar but narrower, 1.5 mm long and exserted apex smaller. *Flowers* pale yellow throughout, the limb slightly deeper; style cream; apex of pollen presenter purple. *Perianth* 40–44 mm long including limb of 4.5–5.5 mm, straight, relaxed after anthesis; claws filiform, 0.4 mm wide, appressed-pubescent in upper half, glabrous in lower half and inside; limb narrowly elliptic to linear, glabrous. *Anthers* 2.5 mm long on filament c. 0.7 mm long, apiculate. *Hypogynous scales* oblong, obtuse, 1 mm long. *Pistil* 39–43 mm long, gently curved, slender, glabrous except a few short hairs on ovary; pollen presenter linear-terete, 1.5–1.8 mm long, obscurely ribbed, slightly swollen at base; stigmatic groove oblique on upper side of apex. *Infructescence* stout, the old perianths and styles persistent and moderately curled. *Follicles* up to 50, largely concealed by old flowers for several years, in plan view elliptic, 13–20 mm long, 7–10 mm high, 6–9 mm wide; valves semi-elliptic, convex, shallowly colliculate, shining, very sparsely hairy but soon glabrous, pale brown; suture fine; opening probably mostly with fire, split from stylar point leaving a broad beak; lips 1.5 mm wide. *Seed* obovate, 22–24 mm long; seed body obovate, 11–13 mm long, 7–8 mm wide, obtuse at base; inner face gently convex, with scattered small ridges, black, glistening; outer face almost flat, with sparse small ridges, ± shining; wing 13–16 mm wide, notched. *Separator* shallowly ridged above seed body.

Other specimens examined. WESTERN AUSTRALIA: Toolinna, S of Caiguna, Great Australian Bight, 22 Oct. 1973, *E. C. Nelson* ANU 17168 (CANB); type locality, 9 Jan. 1986, *J. & L. Falconer* (PERTH); type locality, *G. J. Keighery* (fruit) (PERTH).

Distribution. Known from two localities in the western coast of the Great Australian Bight, Western Australia (Map 1).

Habitat. Grows in deep white sand in heath, atop the coastal limestone cliffs.

Flowering period. April to June.

Conservation status. Rare—code 2RC (Leigh et al. 1981). The localities lie within the Nuytsland Wildlife Sanctuary.

Banksia epica is clearly related to *B. praemorsa* Andrews and *B. media* R. Br., differing from both in the larger perianth (33–34 mm long in *praemorsa*, 32–38 mm in *media*) and the longer pollen presenter (1 mm in *praemorsa*, 0.75 mm in *media*). From *B. praemorsa* it differs further in the indumentum of the perianth (glabrous in *praemorsa*).

From *B. media* it is also distinguished by the small almost flat leaves and the longer, glabrous apex of the common bracts. Plants of *B. media* that occur at Point Culver have narrow leaves 11–12 cm long.

The species is known from Point Culver and Toolinna Rockhole. At the former a large population occurs together with *Banksia media* and *B. speciosa*, while at Toolinna it is the only *Banksia* present. This is the eastern most record of the genus in Western Australia, in 124° 59' E, and may be the locality mentioned by the explorer Edward John Eyre. In the journal of his expedition from Adelaide to Albany—the first such crossing by land—he described sighting Banksias on 1 May 1841, an indication that he was well on the way to his destination. Eyre gather no specimens, the first collection being one in old flower by E. Charles Nelson in 1973 but unavailable when my revision was prepared.

When the Banksia Atlas (a joint project of the Australian Biological Resources Study and the Western Australian Department of Conservation and Land Management) began in 1984, a request was made for participants to collect good specimens. John and Lalage Falconer of Esperance, Western Australia, made two trips in 1985 and 1986. John eventually was able to collect flowering material after a solo expedition from Warburton (where they were then stationed) across the Great Victoria Desert and Nullarbor Plain. It is in recognition of Eyre's epic journey of 1841 and the Falconers' efforts to collect specimens that the new species is named *epica*.

Banksia oligantha, A. S. George, sp. nov. (subgenus *Isostylis*) (Figure 2).

Species inter *B. ilicifoliam* R. Br. et *B. cuneatam* A. S. George intermedia, sed ab illa foliis et floribus minoribus, ab hac foliis nitentibus concavioribus et floribus parum minoribus, et ab ambabus inflorescentia pauciflora, differt. Foliarum lamina 1.5–3.7 cm longa; perianthium 21–23 mm longum; inflorescentia 20-35-flora.

Figure 2. *Banksia oligantha* A. S. George—holotype.

Typus: Nature Reserve 9098, 28 km NW of Wagin, Western Australia, 33° 10' S, 117° 04' E, 18 Nov. 1984, *A. Taylor* s.n. (holo: PERTH; iso: CANB, K, NSW).

A *shrub* to 3 m high, with 1 or few main stems, apparently without lignotuber. *Bark* smooth becoming lightly fissured on lower part of trunk, grey. *Branchlets* hirsute and closely pubescent, becoming glabrous, pale orange-brown or yellow, becoming grey. *Leaves* scattered, obovate to angular-obovate, obtuse but mucronate, very concave, deep green and shining above, paler below with many pits; margins not recurved, with usually 2–4 mucronate teeth c. 1 mm long; lamina 1.5–3.7 cm long, 4–20 mm wide when flattened; petiole 2-3 mm long. *Inflorescences* terminal, numerous, 20–35-flowered, 2.5–3 cm wide at anthesis. *Inflorescence bracts* linear but thick and densely tomentose in lower half, acute and appressed-pubescent at apex, 2–4 mm long. *Common and floral bracts* 4 mm long, narrowly linear, acute, densley white-villous, the apical hairs straighter and brown. *Perianth* 21–23 mm long including limb of 3–3.5 mm, red in lower half grading to cream above, the limb pale yellow, all turning orange-brown; claws somewhat broadened above glabrous base, then narrowed towards limb, appressed-pubescent outside, glabrous inside; limb glabrous. *Hypogynous scales* oblong but narrowed towards obtuse apex, 2 mm long. *Pistil* 19–24 mm long, thickened above ovary than tapering, glabrous; pollen-presenter c. 1 mm long, slightly thickened. *Old flowers* caducous. *Follicles* 1-6, ± ovoid, somewhat curved, 14–19 mm long, 10–15 mm high, 8–9 mm wide; valves smooth, closely tomentose, pale grey with dark mottling, remaining closed or sometimes opening spontaneously, beaked at stylar point; lips c. 1 mm wide, wider at base. *Seed body* ± cuneate, 4 mm long and wide, irregularly wrinkled and grey-brown on outer face, with a few short ridges and black on inner face; wing transversely semi-elliptic to ovate, not notched, 5–6 mm high, 13–16 mm wide, wrinkled, pale brown grading to almost black along lower margin.

Other specimens examined. WESTERN AUSTRALIA: type locality, Sept. 1984, *K. Wallace* (in fruit) (PERTH); type locality, *S. D. Hopper* 4071 (in fruit and young bud) (PERTH).

Distribution. Known only from the type locality where there are about 300 plants (Map 1).

Habitat. Grows in brown and yellow-brown sand in tall shrubland, with *Banksia attenuata, B. prionotes, Eremaea pauciflora, Leptospermum erubescens, Conospermum*, etc.

Flowering period. October-November.

Conservation status. Endangered—code 1EC (Leigh et al. 1981).

This species was discovered in September 1984 by Mr Ken Wallace, Department of Conservation and Land Management, while surveying a nature reserve. It belongs to subgenus *Isostylis*, which previously contained two known species, and although closely related to these is distinct in the low number of flowers in the inflorescence. It is for this feature that the species is named.

The new species occurs in a population of about 300 plants. They appear to have no lignotuber, i.e. are fire-sensitive. The habit is similar to that of *B. cuneata* A. S. George, but otherwise the species has the aspect of *B. ilicifolia* but is smaller in all respects.

The discovery of these two species brings the total in the genus to 75.

Banksia leptophylla A. S. George

Having now re-examined this species in the field, in particular the typical, summer-flowering variant, I now consider it would be useful to name formally the small winter-flowering variant. In their typical forms these variants can be separated morphologically on size of flowers and inflorescence. They occupy different geographical ranges and flower at different seasons. It must be noted, however, that forms intermediate in size and flowering time occur.

Map 1. Distribution of *Banksia oligantha* (▲), *B. epica* (●), *B. leptophylla* var. *melletica* (♦) and *B. spinulosa* var. *neoanglica* (▼).

Banksia leptophylla A.S. George var. **leptophylla**

Perianth 42–47 mm long. Pistil 56–62 mm long. Flowers mainly in summer.

Distribution. Occurs between Tathra National Park and Mogumber, Western Australia (Map 1).

Habitat. On sandy rises in shrubland.

Flowering period. Summer to autumn.

Banksia leptophylla var. ***mellitica*** A.S. George, var. nov.

Ab *Banksia leptophylla* var. *leptophylla* floribus minoribus (perianthiis 30–36 mm longo, pistillo 34–44 mm longo), hieme florentibus, differt.

Typus: c. 13 km N of Gingin turnoff, Perth–Lancelin road, Western Australia, 10 June 1966, *A. S. George* 7761 (holo: PERTH; iso: CANB, K, MEL, NSW).

Distribution. Occurs between the lower Murchison River and Guilderton, Western Australia, mostly within 30 km of the coast (Map 1).

Habitat. In deep sand, in sand over limestone and in depressions (not permanently damp), in shrubland. Often locally common.

Flowering period. Winter.

Conservation status. Not rare. The variety occurs in several conservation reserves and regenerates vigorously from seed after fire.

The varietal epithet is derived from the Greek verb *mello* (to intend to do, only think of doing), in reference to the long period of deliberation over the status of the taxon.

Banksia spinulosa Smith var. **neoanglica** A.S. George, var. nov.

Ab *Banksia spinulosa* var. *cunninghamii* (Sieber ex Reichb.) A. S. George caulorhiza lignotuberosa, ramulis pluribus ad 2m altis, praecipue differt.

Typus: 1 km N of turnoff to New England National Park, Ebor–Armidale road, New South Wales, c. 30° 28' S 152° 17' E, 6 April 1986, *S. C. Clemesha* (holo: NSW; iso: CANB, BRI, MEL, PERTH).

Rootstock lignotuberous. Leaves broadly linear; margins recurved, entire to serrate; nerves obscure on upper surface, hidden on lower by close tomentum that is pale brown becoming white. Perianth golden. Pistil usually black. Follicles usually remaining closed.

Other specimens examined. NEW SOUTH WALES: Lookout Point, Gibraltar Ra., NE of Glen Innes, 24 April 1956, *E. F. Constable* NSW 37323 (NSW); Mt Warning, 3 Oct. 1939, *F. A. Rodway* (NSW); track to Boonoo Boonoo Falls, NE of Tenterfield, 29 Nov. 1970, *I. R. Telford* 2549 (CBG). QUEENSLAND: NE of Wallangarra, 9 May 1970, *M. Fagg* 585 (CBG).

Distribution. New England Tableland, northern New South Wales, and the Macpherson Range, south-eastern Queensland.

Habitat. Usually in granitic or basaltic soil, in heath and woodland.

Flowering period. Late autumn and winter.

Conservation status. Not rare. The variety occurs within several conservation reserves.

In my 1981 revision I recognised three varieties within *Banksia spinulosa*. Experience in using this classification, especially by participants in the Banksia Atlas, has confirmed that these taxa are best retained within one species at the varietal level. The species itself is readily recognised, and usually the varieties also, but problems of identification arise with intermediates. *Banksia spinulosa* var. *cunninghamii* is characterised by the absence of a lignotuber and by indumentum and leaf characters (Nuytsia 3: 396-397). Recent observations and collections, especially by Atlas participants, have confirmed that populations previously included in var. *cunninghamii* in northern New South Wales and south-eastern Queensland are consistent in having a lignotuber. Although in vegetative and floral morphology they cannot be distinguished from var. *cunninghamii* it seems useful to formally recognise the taxon.

The varietal epithet refers to the New England Tableland, the centre of distribution.

The presence or absence of a lignotuber is reflected in the above-ground growth form of a plant. One with a lignotuber usually has several main stems whereas one without a lignotuber usually has a single stem and grows much taller (e.g. see George 1981, fig. 72, p. 392). In each case the above-ground parts are killed by fire, but the lignotuberous form then sprouts from its rootstock while the other is killed and regenerates only from seed. Seedlings of lignotuberous plants are rare in the wild, and in some taxa (e.g. *Banksia sphaerocarpa* R. Br.) the production of seed is low. When seedlings of lignotuberous plants do survive they usually grow much less quickly than those of non-lignotuberous plants. The evolution of the lignotuber in Australian plants is evidently a response to fire, but populations of such taxa appear stable in having little recruitment of new plants. Thus on the one hand they have developed a safeguard against fire, but on the other are at a disadvantage in competing for new space with non-lignotuberous taxa.

Three other species of *Banksia* appear to show this divergence of habitat but require further study. They are *B. ashbyi* B.L. Burtt, *B. marginata* Cav. and *B. violacea* C. Gardner. The situation also exists in some species of the genus *Dryandra*, e.g. *D. armata* R. Br., *D. fraseri* R. Br.

Presumed natural hybrid

While recording Banksias for the Banksia Atlas, Mr G. Schmidt of Kalamunda, Western Australia, discovered a plant which appears to be a hybrid between *B. prionotes* Lindley and *B. lindleyana* Meissner. In most characters it is intermediate between these two, both of which were present with the presumed hybrid and which belong to closely-related series within the genus. The leaves, however, are similar to those of *B. prionotes*.

Spreading shrub 2.5 m tall. Leaves to 22 cm long, 13–15 mm wide; margins flat, shallowly lobed almost to base; lobes ± triangular, to 2 mm high, obtusely and shortly mucronate. Inflorescence 12–13 cm long. Perianth 37 mm long including limb of 8 mm; claws closely tomentose and shortly hirsute; limb minutely pubescent. Pistil 40–45 mm long, bowed, glabrous; pollen presenter c. 3.5 mm long, swollen at base, fusiform and ribbed above. Old flowers persistent on infructescence, the pistils wiry. Follicles elliptic in plan view, 12–13 mm long, 7–8 mm wide, 4 mm high, shortly beaked at stylar point, densely hirsute.

Specimen examined. 4.5 km N of double gate in State Barrier fence, N edge of Murchison House Stn, Western Australia, 27° 34' S, 114°03' E, 8 Sept. 1985, *G. Schmidt* (PERTH).

A single plant of the presumed hybrid was sighted, and the description is based on two fruiting specimens, probably developed from the previous season's flowering. The persistent perianths and pistils have retained their morphology. Each inflorescence has produced a number of follicles that are fully grown but were probably not fully mature when collected.

Only two other presumed natural hybrids in *Banksia* in Western Australia have been reported, one between *B. hookeriana* Meissner and *B. prionotes* (Keighery 1985), the other between *B. hookeriana* and *B. menziesii* R.Br. (Dixon 1986). In contrast, natural hybrids appear to be frequent in eastern Australia.

Further names in *Banksia*

The following names were found by Mr Arthur D. Chapman while searching literature for entries for the Australian Plant Name Index. None affects the accepted nomenclature of *Banksia*.

Banksia lamberti Hort. ex Courtois, Magasin d'Horticulture, Suppl. l: 295 (1833). *Type citation:* none given.

No sheet bearing this name has been seen. From the description it appears that this may be synonymous with *B. spinulosa* Smith var. *cunninghamii* (Sieber ex Reichb.) A.S. George.

Banksia intermedia Sweet ex Courtois, Magasin d'Horticulture, Suppl. l: 295 (1833); *Banksia intermedia* Sweet, Hort. Brit., 2nd edn. 2: 349 (1827), nomen nudum. *Type citation:* "in Nova Hollandia [Australia], introduced to Britain in 1824" (Sweet).

No sheet bearing this name has been seen. The description is of leaves only and is insufficient to allow definite application of the name. It is possibly a synonym of *B. oblongifolia* Cav.

Banksia longifolia var. *pubescens* (Willd.) Breiter, Hortus Breiterianus 282 (1817).

This is based on *Cochium pubescens* Willd. which is not a *Banksia* but probably a *Hakea*.

Distributional note

Banksia plagiocarpa A. S. George has been rediscovered on the Queensland mainland. Discovered in 1867 and re-collected in 1868 by John Dallachy on the Coast Range at Rockingham Bay, Qld, it was not collected again until 1981 when the type collection was gathered on Hinchinbrook Island. In 1983 Mr Ian R. Telford, of the Australian National Botanic Gardens, found the species on Bishop Peak in the Coast Range, opposite Hinchinbrook Island.

Acknowledgements

I am grateful to Mr Ken Wallace, Mrs Anne Taylor and Dr Stephen D. Hopper, Department of Conservation and Land Management, Western Australia, for material of *Banksia oligantha*, Greg J. Keighery of the same Department for specimens of *B. epica*, Mr John & Mrs Lalage Falconer, Esperance, Western Australia, for material of *B. epica*, and Mr S. C. Clemesha, Woolgoolga, New South Wales, for information and specimens of *B. spinulosa* var. *neoanglica*. Mr Arthur D. Chapman, Bureau of Flora and Fauna, Canberra, located the publications containing early names in *Banksia*.

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Ptilotus crispus, a new species of Amaranthaceae in the Kimberley Division of Western Australia

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Abstract

Benl, G. *Ptilotus crispus*, a new species of Amaranthaceae in the Kimberley Division of Western Australia. Nuytsia 6(3): 319-323 (1988). A new species of *Ptilotus, P. crispus* Benl, from the Kimberley Region of Western Australia, is described and discussed. The taxon is illustrated by analytical drawings; a photograph of the holotype sheet is provided.

Ptilotus crispus Benl, sp. nov. (Figures 1 & 2)

Herba annua inconspicua, caulibus 3-5 gracilibus 2.5 cm usque ad c. 25 cm longis prostratis parce ramosis et foliatis plurispicatis; primo pilis subcrispis laxe puberula tandem glabrescens. Folia plurima opposita oblonga vel lanceolata, ad c. 1.2 x 0.5 cm. Inflorescentiae plerumque solitariae conici-ovoideae vel anguste cylindraceae ad 1.5 cm longae; rhachis omnino glabra; flores pedicellati c. 10-60 conferti visu albidi, juveniles subglobulares, adulti rotati. Bractea et bracteolae maiores hyalinae persistentes, longitudinem perianthii maturi haud attingentes, pubescentia parca inaequali insignes: pilis dorsalibus rigidi crassiusculis partim apicem excedentibus fragilibus, pilis marginalibus tenuibus curvatis plus minusve caducis. Perianthium maturum a juvenili parce piloso valde differt, denique parte infera tepalorum pseudotubum obconicum formans. Tepala libera integra subaequalia tandem c. 2-3 x 1.5-2 mm, post anthesin omnia conspicue bipartita: in parte infera lineari pilis minutis crispis intricatis dense obsessa, in parte supera maxime dilatata et explanata parce pilosula. Androecium et gynoecium perianthio multo breviora. Stamina 5 omnia fertilia aequalia; filamenta basi dilatata in cupulam humilem coalita; pseudostaminodia interiecta nulla. Ovarium complanati-globosum glabrum; stylus centralis brevis; stigma primo capitellatum.

Taxon novum praesertim ob formam rotatam florum adultorum, ob modum pubescentiae tepalorum et rhachim glabram ab omnibus speciebus generis adhuc cognitis distinguitur.

Typus: 3.6 km north by road from Kalumburu on road to Pago Mission; Gardner Botanical Distriict; 14°16'S, 126°37'E; 1 May 1985, *T.E.H. Aplin, R.J. Cranfield, B.L. Rye & J.R. Wheeler* 853 (holo: PERTH; iso: M).

Ephemeral and more or less prostrate *herb* spreading to 30 cm or more across when fully in flower; stems and foliage evenly and shortly-hairy when young; tap-root slender, 3-3.5 cm long; floriferous parts unattractive. *Stems* 3-5, wiry, usually with one central stem 8-25 cm long, ascending, becoming prostrate and 2-4 shorter procumbent ones, little-branched, terete to slightly angular and slightly compressed where branched, purplish-tinged, loosely pilose with simple more or less curved to crisp nodulose semi-

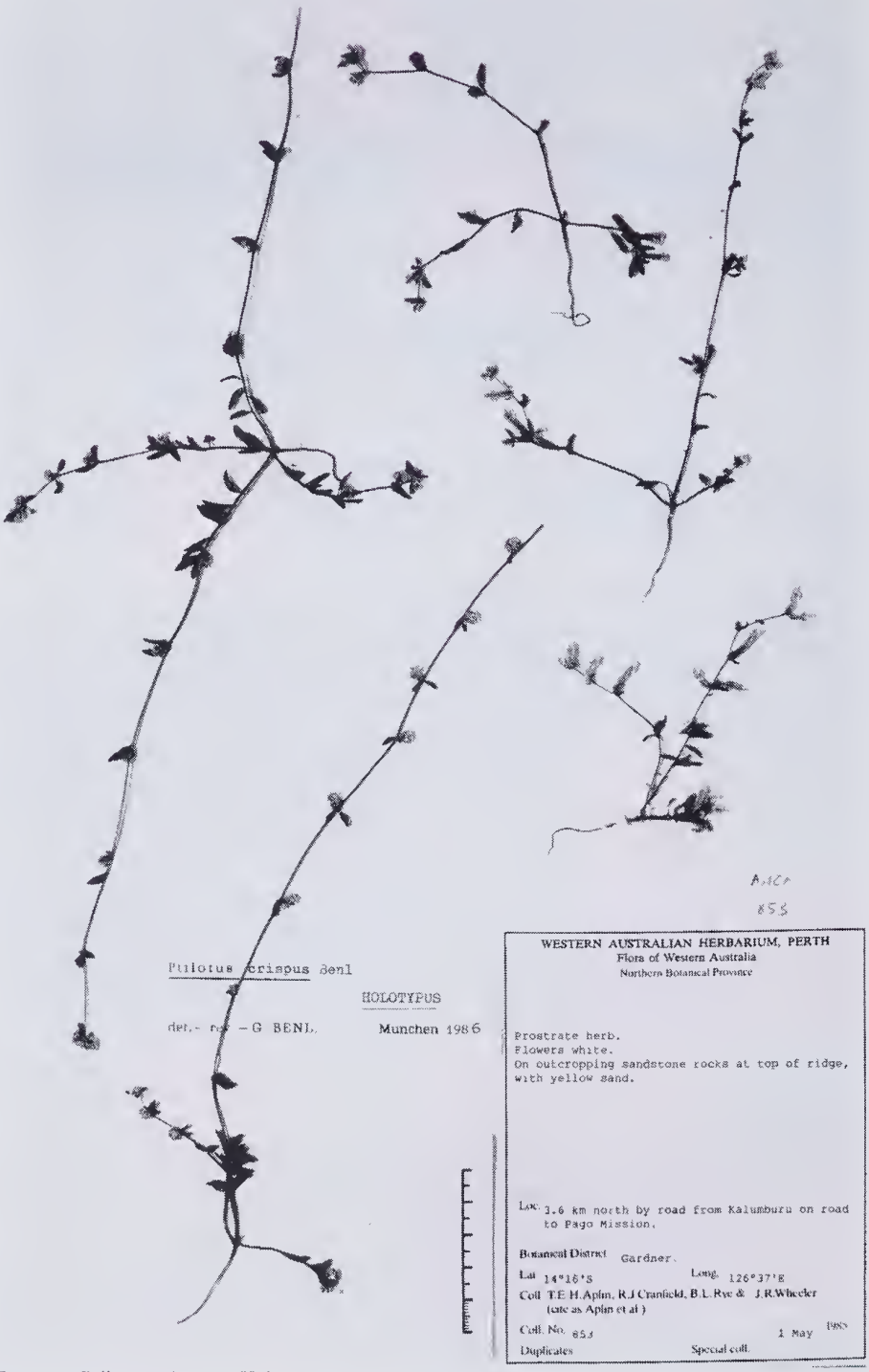

Figure 1. *Ptilotus crispus*. - Holotype sheet (PERTH). Photograph by K. Liedl.

appressed hairs 0.3-0.8 mm long, at length glabrescent. *Leaves* all cauline, sparse up to 20 per stem, 0.2-3.2 cm apart, often opposite with 1 or rarely 2 spikes between, less often alternate, almost vertical to axis, thick and coriaceous, becoming rugose when withering, (4)5-10(12) x (1.5)2-3.5(5) mm, initially pilose on both sides with hairs as for the stems but becoming glabrous sooner; uppermost ones reduced. *Blade* oblong-elliptic to almost linear-lanceolate, bright-green to yellow-green on both surfaces, tapering at base into a petiole up to 1.2 mm long, margins entire, cartilaginous, often recurved, midrib raised underneath. *Flower spikes* up to 30 per plant, axillary or sometimes terminal, usually sessile, solitary or occasionally in pairs, divided at the base, compact, variable in shape and size, ovoid to conical (c. 4-6 x 4.5 mm) with about 10-15 flowers or cylindric (c. 15 x 4 mm) with up to 60 closely arranged flowers (lower ones falling out as spikes elongate), greenish-white becoming cream. *Rachis* obviously glabrous, yellow-green, sulcate when dry, c. 0.7 mm in diameter. *Flowers* at first more or less globose, ultimately wheel-shaped. *Pedicels* glabrous, 0.15-0.2 mm long, articulate above bracteoles. *Bract and bracteoles* broadly ovate and concave, shorter than mature perianth, membranous-scarious, transparent and shiny, entire, with a greenish blotch at the base which turns brown with age, persistent, with two kinds of hairs; dorsal hairs on the distal half, stout, obscurely septate and often with a more or less club-shaped terminal cell, averaging 0.3-0.4 mm long, projecting in part beyond the bract and bracteole apex by 0.1-0.25 mm, breaking off with age; marginal hairs delicate, curved, 0.1-0.2 mm long, caducous. *Bract* subacute, 0.6-0.9 x 0.4-0.6 mm; bracteoles more obtuse, 1-1.2 x 0.8-0.9 mm. *Perianth* straight at anthesis, with the upper parts of tepals incurved, free down to an open disc-like base, scarious, entire, green fading to brownish in a faintly 3-ribbed lower region, with in the upper portion thick dorsal hairs which overtop the apex in part and thinner marginal hairs matching those of the bract and bracteoles; outer tepals narrowly obovate to narrowly spathulate, 1.3-1.6 x 0.7-0.9 mm; inner tepals almost broadly elliptic, 1.2-1.4 x 0.7-0.8 mm. *Tepals* all enlarging after anthesis to 2.2-2.8 mm long, hardening in their lower portion and becoming conspicuously 3-ribbed, the claws of the tepals together forming a turbinate false tube of 1.2-1.4 mm while fruit is ripening; base and ribs of the rigid claws of perianth finally clothed on the outside with minute curly-entangled hairs (c. 0.15 mm long) and inside with a loose wool of longer crisp hairs (to c. 1 mm long); limbs of tepals remaining scarious but spreading, becoming almost circular or broader, those of the inner tepals expanding to 1.2 x 1.6 mm and those of the outer tepals to 1.4 x 2 mm, often overlapping each other and giving the perianth a wheel-shaped appearance when viewed from above; scant hairiness of limbs includes remnants of the juvenile pubescence and is restricted to the dorsal surface. *Androecium* consistently pentamerous with the short stamens all perfect; free part of filaments flattened in lower half, usually 0.5-0.7 mm long, 0.02-0.03 mm broad at middle, widened downwards to c. 0.06 mm, basally fused with acute angles into a minute cupule; anthers pale yellow, broadly-ellipsoidal, up to 0.2 x 0.15 mm, soon withering; intrastaminal lobes absent. *Pistil* glabrous; ovary at length sessile, complanate-globose, c. 0.3 x 0.25 mm at anthesis, later c. 0.7 x 0.5 mm; style central, short, rigid, 0.2-0.25 mm long by 0.03 mm diameter and thickened at base to 0.05 mm, persistent; stigma initially capitellate-papillose, becoming inconspicuous. *Seed* thick, lenticular, c. 1.4 x 1 mm, reddish brown.

Etymology. The specific epithet of this taxon refers to the crisp external indumentum of the lower region of the mature tepals.

Habitat. Eleven specimens (most of them not reaching 15 cm long) were found growing amongst outcropping sandstone rocks at top of a ridge, with yellow sand.

Distribution. *Ptilotus crispus* is a rare plant represented only by the type collection and is probably endemic to the Kimberley District.

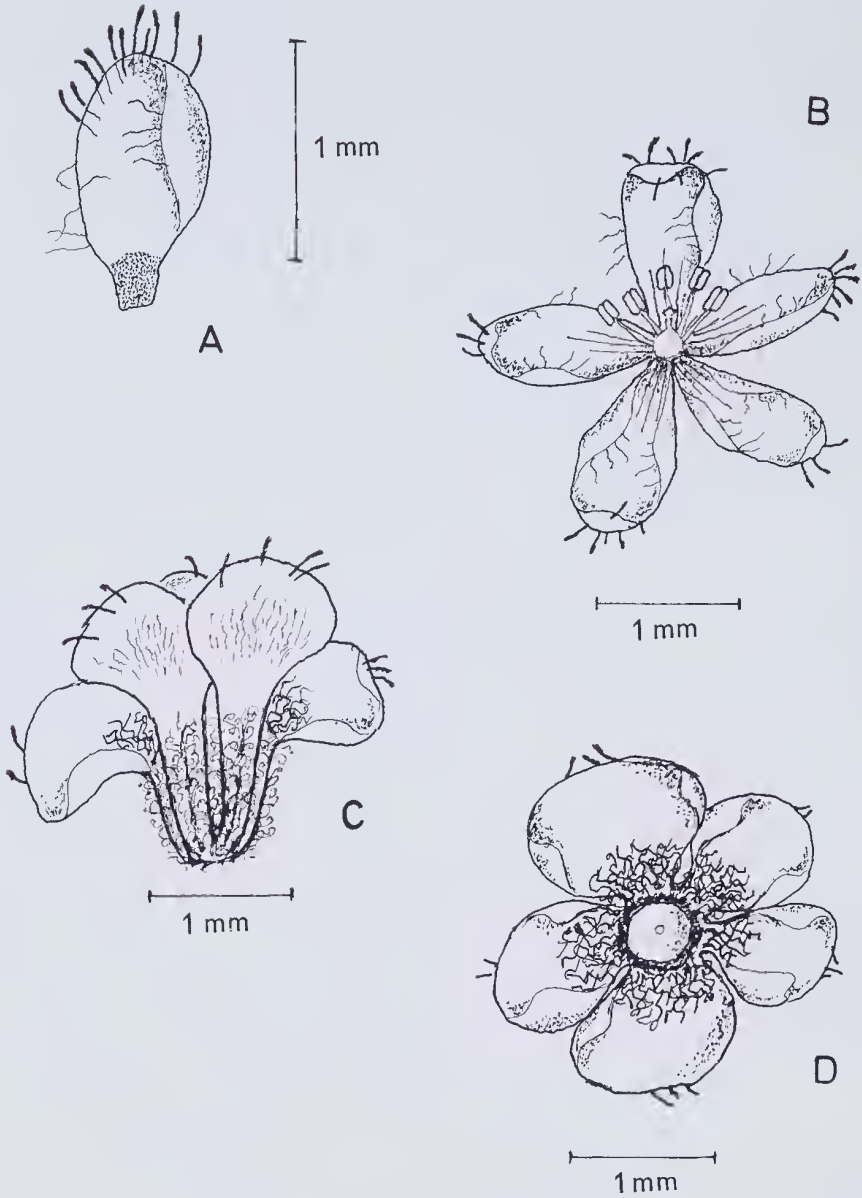

Figure 2. *Ptilotus crispus*. A - Bracteole. B - Newly opened flower with mature anthers but immature style. C - Side view of mature perianth. D - Flower with mature gynoecium, androecium shed.

Drawn by R. Mader from the holotype.

Discussion. Thickly rigid hairs on the distal zone of bracts and tepals are also characteristic of *Ptilotus comatus* Benl and *P. rotundatus* Benl, the rounded tepals of the latter being fringed by a unique wreath of very short hairs (Benl 1984, Figure 2C). Regarding the kind of flower pubescence the new taxon bears more resemblance to *P. comatus* where, however, the hairs form a distinct and persistent brush-like vestiture on tepal apices (Benl ibid., Figure 2B). On the other hand *P. comatus* lacks the finely curled external indumentum on the ribs and the coarser internal wool in the middle of all mature tepals as well as the inconspicuous strongly appressed, more or less substraight minute hairs on the dorsal face of the limbs in ripened flowers. In both species, *P. comatus* and *P. rotundatus* adult tepals are not clearly bipartite, the mature perianth is not markedly wheel-shaped. There are a number of additional differences concerning general habit as well as vegetative and flora details. The glabrous rachis in *Ptilotus crispus* must be emphasized: it is a significant feature evidently unknown elsewhere in the genus. Furthermore, I do not know another *Ptilotus* where each flower tepal develops five distinct kinds of hair.

Hence *Ptilotus crispus* is clearly defined as a new species, although there are affinities with a group of *Ptilotus* taxa showing more or less comose tufted perianth hairs and having a structure of inner floral organs similar to that of *P. crispus*.

Reference

Benl, G. (1984). New taxa in *Ptilotus* R.Br. (Amaranthaceae) from the Northern Territory. Muelleria 5: 249-261.

Eucalyptus foecunda revisited and six related new species (Myrtaceae)

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Abstract

Brooker, M.I.H. *Eucalyptus foecunda* revisited and six related new species (Myrtaceae). Nuytsia 6(3): 325-334 (1988). *Eucalyptus foecunda* Schauer is recognised as being restricted to coastal Western Australia from Yalgorup National Park to Lancelin. Six new species in the informal "*Eucalyptus* series *Foecundae*" Pryor & Johnson are described, viz. *E. hypochlamydea*, *E. salicola*, *E. perangusta*, *E. latens*, *E. dissimulata*, and *E. kumarlensis*. The identity and location of *E. leptophylla* F. Muell. var. *floribunda* Blakely are discussed. The new species are characterised by habitat, habit, bark, juvenile leaves, and to a lesser extent the flower buds.

Introduction

The taxonomy and variation in the widespread informal "*Eucalyptus* series *Foecundae*" Pryor & Johnson were treated in a revision of the series (Brooker 1979). The results of this study were obtained from the examination of herbarium specimens and from, what is clear now, an inadequate field assessment, particularly of *E. foecunda* Schauer itself. Since that time numerous field trips in the southern half of Western Australia have been made. A number of new species in the series has been found and re-evaluation has been possible of at least two forms previously considered ambiguous.

Of considerable value in the re-assessment of the series has been the recognition of the importance of habitat, habit, and bark characters, data which are often absent or indeterminate on herbarium labels.

In the revision (Brooker 1979) two atypical forms were retained in what was then believed to be *E. foecunda:* (1) the salmon gum-like tree with narrow-leaved seedlings found south of Norseman, and (2) the extremely narrow-leaved mallee from west, north, and north-east of Ravensthorpe and the Lake King area. Subsequent field-work shows that these forms are deserving of taxonomic status and are described in this paper as *E. kumarlensis* and *E. perangusta*.

Another taxon treated in the earlier paper, *E. leptophylla* F. Muell. var. *floribunda* Blakely, was synonymised with *E. foecunda*. Since then, a search has been made by the author and S. D. Hopper at and near the type locality, south-east of Mt Churchman, for plants that might be this variety. In November 1986 L. A. S. Johnson, D. F. Blaxell and K. Hill also searched in the type area. No populations of any "*E.* series *Foecundae*" trees or mallees were found by either party and the geographically nearest species in the series is a northern wheatbelt mallee which lacks the "subglaucous branchlets" of the description given by Blakely. This northern wheatbelt form is readily identifiable in the field by its characteristic butt of rough bark and is here described as *E. hypochlamydea*. A seedling of *G. M. Chippendale* 245, illustrated in Brooker (1979), is typical of this taxon and was wrongly attributed to *E. foecunda*. Matching the type of *E. leptophylla* var. *floribunda* will have to await further field exploration in an area difficult of access. The nearest species in "*E.* ser. *Foecundae*" to the south-east of the presumed type area is *E. salicola* referred to below.

Only recently have I become aware of another salmon gum-like tree, but with glaucous, ovate seedling leaves. It is widespread in the central and northern wheatbelt east to the Great Victoria Desert, and occurs characteristically around the edges of salt lakes. It is described here as *E. salicola*.

In 1985 my attention was drawn by I. Rotheram of the Western Australian Department of Conservation and Land Management to a population of mallees in the jarrah forest of the Darling Range near North Bannister. This is another species in the *"E.* series *Foecundae"*. It is characterised by the short, linear-oblong, glaucous juvenile leaves seen readily in the population as stem coppice. The North Bannister area is notable for the scattered occurrence of five species of mallee occurring in relatively dense, more or less pure stands in natural "clearings" in the jarrah forest, namely *E. decurva* F. Muell., *E. falcata* Turcz., *E. drummondii* Benth., an as yet unnamed species *(E.* series *Subulatae* Blakely) and that described here as *E. latens (E.* series *Foecundae).*

Another new mallee has been recently recognised in the Pingrup, Lake Magenta and Lake Grace areas. This is described as *E. dissimulata* and its distribution overlaps that of *E. albida* Maiden & Blakely.

A single specimen collected in 1970 near Cundeelee, *M.I.H. Brooker* 2599 (PERTH), which consisted of only foliage and fruit was not treated in the 1979 study as it lacked buds to confirm its affinity. On a recent field trip (May 1984) to the Great Victoria Desert made by the author and S. D. Hopper, an extensive population of this form was found, again only in fruit, but I have no doubt of its belonging to the *"E.* series *Foecundae"*. It has seedlings similar to those of the new species in the Ravensthorpe-Lake King area referred to above, but the adult leaves are consistently broader. Further determination must await the finding of buds. Its geographic remoteness precludes early resolution of this problem.

Of fundamental importance in this discussion has been the re-examination of a population from which the type of *E. foecunda* is believed to have been taken. The type is *[J.A.] L. Preiss* 231 from the Fremantle area where only few plants are known to survive (August 1984), the nearest well known populations being in the dunes facing Perry Lakes, 20 km to the north. The surviving plants, which were earlier only appraised from a hand specimen, could be mistaken for one of the widespread forms attributed to *E. foecunda* (sensu Brooker 1979), which extends as far as central New South Wales, when adult leaves, buds and fruits alone are considered. However, the stems of the Fremantle plants are now known to be completely rough-barked and the juvenile leaves are lanceolate and green, not ovate to elliptical and glaucous as are those of the taxon of south-eastern Australia. Populations apparently identical to the presumed remnant of the typical stand and the others referred to above occur as far south as the Yalgorup National Park, on Wabling Hill north of Yanchep, and at various localities further north towards Lancelin. *E. foecunda* s. str. is not known to overlap with any other species of the *"E.* ser. *Foecundae"*. Those specimens previously attributed to *E. foecunda* (Johnson 1962, Brooker 1979), occurring in the mallee scrubs of southern Australia as far as central New South Wales which are smooth-barked mallees having seedlings with ovate to elliptical glaucous leaves (to 2.5 x 1.5 cm), should now be referred to *E. leptophylla* F. Muell. [type—"Murray scrub" collected by H. Behr].

Considering the number of new species in the series recognised in the last few years it is not unlikely that more will be found. Also the Cundeelee species will need confirmation and taxonomic treatment. For the present I have restricted this paper to the publication of six new species while providing a key for the whole series as it is known to date.

The new species have been recognised largely by field assessment. They have been confirmed by close examination of herbarium specimens and inferences from label data on the sheets in PERTH and to a lesser extent in FRI. Juvenile leaf characters, which can usually be seen in stem coppice of some species in the field, e.g. *E. salicola*, were observed in glasshouse trials on the progeny of many individual parent-plants of each new species and compared with various related taxa, including *E. foecunda* s. str.

Key to taxa of "*E.* series *Foecundae*" (new species enumerated)

1. Tree
   2. Juvenile leaves orbicular to ovate, glaucous [around salt lakes in wheatbelt and Great Victoria Desert] .....2. *E. salicola*
   2. Juvenile leaves narrow (to 0.6 cm wide)
      3. Bark rough [north of Southern Cross] .....*E. formanii*
      3. Bark smooth [south of Norseman] .....6. *E. kumarlensis*
1. Mallee
   4. Juvenile leaves connate [southern, coastal and subcoastal].....*E. uncinata*
   4. Juvenile leaves free
      5. Juvenile leaves ovate to orbicular or elliptical, glaucous; buds to 0.7 x 0.3 cm
         6. Bark rough over part or whole of stems.
            7. Mature crown with many juvenile leaves [south of Shark Bay to Exmouth].....*E. fruticosa*
            7. Mature crown with adult leaves [northern wheatbelt to north of the Murchison River].....1. *E hypochlamydea*
         6. Bark smooth
            8. Style bent; juvenile leaves usually white [southern wheatbelt, north and north-west of Badgingarra] .....*E. albida*
            8. Style straight; juvenile leaves blue-green to glaucous [eastern goldfields, South Australia, Victoria, New South Wales].....*E. leptophylla*
      5. Juvenile leaves linear to lanceolate, if elliptical, then buds to 1.1 x 0.5 cm.
         9. Bark rough
            10. Juvenile leaves lanceolate, green [coastal from Yalgorup National Park to Lancelin].....*E. foecunda*
            10. Juvenile leaves linear, mealy white [north of Southern Cross] .....*E. formanii*
         9. Bark smooth
            11. Adult leaves linear [west, north and north-east of Ravensthorpe] .....3. *E. perangusta*
            11. Adult leaves narrowly lanceolate to lanceolate
               12. Juvenile leaves linear-oblong or narrowly elliptical, glaucous [North Bannister] .....4. *E. latens*
               12. Juvenile leaves elliptical or lanceolate, green or grey-green
                  13. Operculum rounded, much shorter than hypanthium [east and north-east of Esperance] .....*E. discreta*
                  13. Operculum conical, ± equal to hypanthium
                     14. Juvenile leaves lanceolate, to 7 x 1.5 cm, flat, green [wheatbelt to Great Victoria Desert].....*E. rigidula*
                     14. Juvenile leaves elliptical, to 4.5 x 1.5 cm, slightly concave above, blue-green to greyish green [Pingrup to Lake Grace area].....5. *E. dissimulata*

It will be seen from the key and species' accounts that the taxonomy and field identification are based strongly on habitat, habit, bark, and juvenile leaf characters. The stamen and seed characters are common to all six species and are diagnostic for the series. For description of these, reference can be made to the earlier study (Brooker 1979).

For many of the taxa the bud and fruit distinctions are not great, but bud shapes are shown in Figure 2 for comparison. In Figure 3, seedlings of the various species are shown for comparison.

New Taxa

1. **Eucalyptus hypochlamydea** Brooker, sp. nov. (Figures 1, 2a, 3a)

Frutex "mallee" *Eucalypto leptophyllae* F. Muell. affinis a qua caulibus cortice fibroso ad basin, foliis juvenilibus majoribus orbicularioribusque (ad 3 x 2.8 cm) et operculis semper rostratis differt.

Typus: 13.8 km E of Mullewa towards Pindar, 24 January 1984, *M.I.H. Brooker* 8412 (holo: PERTH; iso: FRI, NSW, MEL).

A *mallee* to 7 m tall with rough basal bark to 1-2m. *Juvenile leaves* sessile, opposite for many pairs, ovate to orbicular, to 3 x 2.8 cm, dull, glaucous. *Adult leaves* petiolate, alternating, narrowly lanceolate to lanceolate, to 9 x 1 cm, concolorous, glossy, green. *Inflorescences* axillary, unbranched, 7 to 11-flowered; peduncles flattened, 0.4-0.9 cm long. *Buds* pedicellate, fusiform, to 0.7 x 0.3 cm; operculum beaked. *Fruit* pedicellate, cupular barrel-shaped, to 0.5 x 0.5 cm; rim thick; disc obliquely descending, whitish; valves 3(4), to rim level or enclosed.

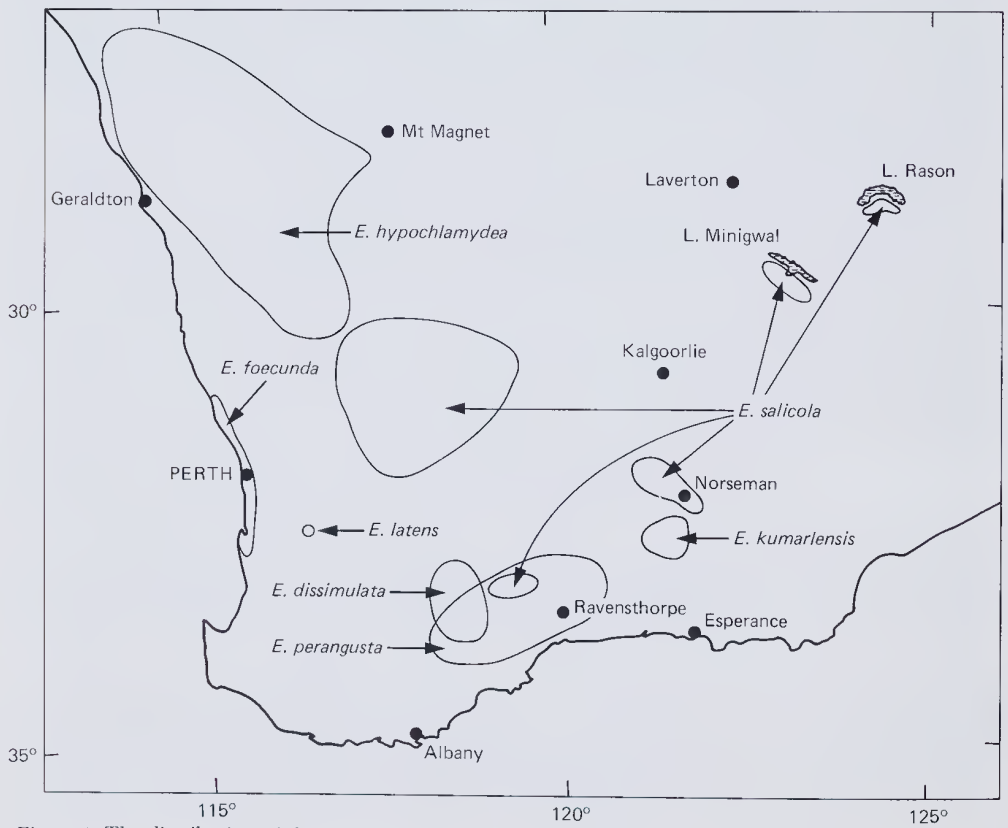

Figure 1. The distribution of the six new species and of *E. foecunda*.

Selection of specimens examined. WESTERN AUSTRALIA: 6.4 miles N of Marchagee, *G.M. Chippendale* 34 (FRI, PERTH): 11.7 miles ENE of Mulleway, *G.M. Chippendale* 245 (FRI); 12 km SW of 'Nalbarra' *P.G. Wilson* 8599 (PERTH); 14 km E of Wilcock's road along N side of Watheroo National Park, *M.I.H. Brooker* 7523 (FRI, PERTH); Gutha; *S.D. Hopper* 3132 (PERTH); 7.5 km E of Mt Adams Reserve on Yandanooka road, *M.I.H. Brooker* 8405 (FRI, PERTH, NSW); type locality, *M.I.H. Brooker* 8411, 8413 (FRI, PERTH, NSW); 36.6 km S of Pindar via Regan's, William's and Kelly's roads, *M.I.H. Brooker* 8418 (FRI, PERTH, NSW); E of Binnu, *M.I.H. Brooker* 8726 (FRI, PERTH, NSW); 61 km E of Mullewa, *M.I.H. Brooker* 8728 (FRI, PERTH, NSW); between Northampton and Binnu, *M.I.H. Brooker* 9035 (FRI, PERTH); 5 km E of Trayning, *M.I.H. Brooker* 9166 (FRI, PERTH, NSW); c. 20 km S of Mingenew on Eneabba road, *M.I.H. Brooker* 9203 (FRI, PERTH, NSW); 77 km NE of Wubin, *M.I.H. Brooker* 9229 (FRI, PERTH, NSW); 1 km N of Dalwallinu, *M.I.H. Brooker 9263* (FRI, PERTH, NSW); 15.7 km S of Red Bluff turn-off S of Kalbarri, *M.I.H. Brooker* 9402 (FRI, PERTH, NSW).

Distribution. Northern wheatbelt and to north of the Murchison River, Western Australia, usually on relatively flat country on red sandy soils; on coastal limy sand south of Kalbarri. Despite the abundance of specimens available for examination, label data provide little information on associates, but *E. brachycorys* Blakely, *E. eudesmioides* F. Muell. and *E. obtusiflora* DC. have been recorded.

Flowering period. November-February.

Etymology. The name alludes to the basal rough bark (Gk. *hypo*—below, *chlamydos*—mantle).

Notes. This species is easily recognised in the field by the stocking of rough bark. The operculum of the bud is beaked, not rounded as is *E. leptophylla*.

2. **Eucalyptus salicola** Brooker, sp. nov. (Figures 1, 2b, 3b)

Arbor *Eucalypto leptophyllae* F. Muell. affinis a qua habitu arboreo, foliis juvenilibus orbicularioribus, operculis acutis et habitatione saline differt.

Typus: 14.6 km east of Kulja Central road on Mollerin North road, 24 January, *M.I.H. Brooker* 8433 and *S.D. Hopper* (holo: PERTH; iso: FRI, NSW).

A *tree* to 15 m tall with powdery white, grey or salmon pink, smooth bark. *Juvenile leaves* sessile, opposite for many pairs, orbicular to ovate, to 2.5 x 2 cm, dull, glaucous. *Adult leaves* petiolate, alternating, narrowly lanceolate to lanceolate, to 9 x 1 cm, concolorous, glossy, green. *Inflorescences* axillary, ungranched, 7- to 11-flowered; peduncles slightly angular, 0.4-0.9 cm long. *Buds* pedicellate, fusiform, to 0.8-0.3 cm; operculum beaked. *Fruit* pedicellate, cupular (sometimes slightly urceolate), to 0.5 x 0.4 cm; rim thick; disc descending, whitish; values 3(4), to rim level or enclosed.

Specimens examined. WESTERN AUSTRALIA: c. 6 km S of Cunderdin Hill, *M.I.H. Brooker* 8245 (FRI, PERTH, NSW); 34 and 80 km W of Coolgardie-Norseman road on Hyden track, *M.I.H. Brooker* 8352, 8354 (FRI, PERTH, NSW); 2.8 km E of Sanderson road on Glamoff road east of Wubin, *M.I.H. Brooker* 8430 (FRI, PERTH, NSW); 18,5 km S of Beacon on Bencubbin road, *M.I.H. Brooker* 8437 (FRI, PERTH, NSW); S side of Lake Wallambin, NW of Trayining, *M.I.H. Brooker* 8439 (FRI, PERTH, NSW); S side of Cowcowing Lakes, *M.I.H. Brooker* 8441 (FRI, PERTH, NSW); S side of Lake Rason, 152 km NW of airstrip, Great Victoria Desert, *M.I.H. Brooker* 8578 (FRI, PERTH, NSW); 6.4 km N of PNC road towards Lake Minigwal, *M.I.H. Brooker* 8596 (FRI, PERTH, NSW); Lake Minigwal, south side, 24 km W of approach track from S, *M.I.H. Brooker* 8600 (FRI, PERTH, NSW); 36.7 km N of Bullfinch towards Die Hardy Range, *M.I.H. Brooker* 8692 (FRI, PERTH, NSW); Wilson-Brooker road intersection with Newdegate-Ravensthorpe road, *M.I.H. Brooker* 8896 (FRI, PERTH, NSW); road to Dundas Rocks, S of Norseman, *M.I.H. Brooker* 8903 (FRI, PERTH, NSW).

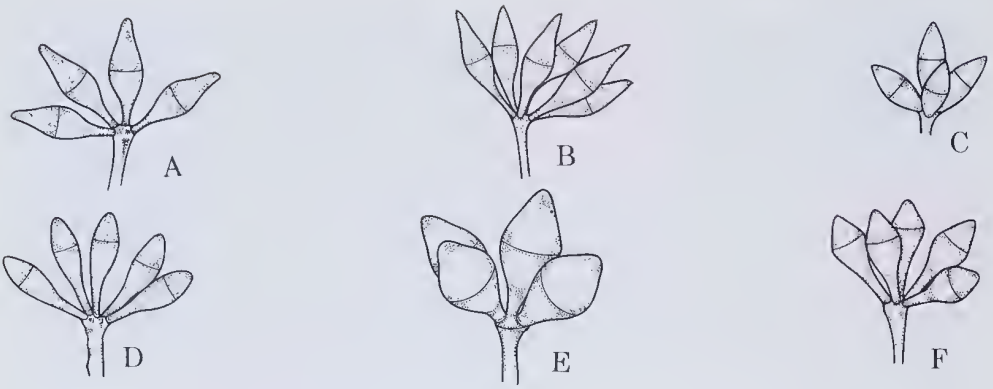

Figure 2. Buds of the new species of the "*E.* series *Foecundae*" (x 1.5).

A—*E. hypochlamydea (MIHB* 8412). B—*E. salicola (MIHB* 8439). C—*E. perangusta (MIHB* 8672). D—*E. latens (MIHB* 9046). E—*E. dissimulata (MIHB* 8768.) F—*E. kumarlensis (MIHB* 8905).

Distribution. Around salt lakes in the northern and southern wheatbelts, eastwards to at least Lake Minigwal and Lake Rason in the Great Victoria Desert, Western Australia. *E. salicola* may be the only eucalypt at some sites, at others it is associated with *E. salubris* F. Muell., *E. kondininensis* Maiden & Blakely, *E. sheathiana* Maiden and *E. melanoxylon* Maiden.

Flowering periods. February-April.

Etymology. The name is descriptive of the distinctive habitat (L. *salis*—salt, *cola*—dweller).

Notes. This species has the appearance of *E. salmonophloia* F. Muell., being a grey or pink smooth-barked tree to 20 m tall and 0.8 m dbh. Not all of the numerous salt lakes in its area of distribution have been checked but it seems likely that it will be found around many of them. Because it occurs in the western part of the Great Victoria Desert it will be of interest to seek it in similar situations of the South Australian part of the desert.

The sessile, orbicular to ovate, glaucous stem coppice leaves are frequently present and distinguish it readily from salmon gum which belongs in another series and on which stem coppice is not conspicuous (seedling and juvenile leaves are petiolate). The operculum of the bud is beaked.

Because of its size, form and adaptation to saline sites, *E. salicola* is likely to be a useful species for reclamation and fuelwood production.

3. **Eucalpytus perangusta** Brooker, sp. nov. (Figures 1, 2c, 3c)

Frutex "mallee" *Eucalypto formanii* Gardner affinis a qua habitu parviore multicauli, cortice laevi et foliis juvenilibus minus glaucis differt.

Typus: Oldfield's road east of Young River crossing, 9 April 1983, *M.I.H. Brooker* 8076 and *S.D. Hopper* (holo: PERTH; iso: FRI, NSW).

A *mallee* to 2 m tall with light grey to pinkish grey, smooth bark. *Juvenile leaves* sessile, opposite for many pairs, linear, to 7 x 0.5 cm. *Adult leaves* petiolate, alternating, linear, to 9 x 0.5 cm, concolorous, glossy, green. *Inflorescences* axillary, unbranched, 7-flowered; peduncles flattened, 0.2-1 cm long. *Buds* shortly pedicellate, fusiform, to 0.8 x 0.3 cm; operculum conical. *Fruit* pedicellate, cupular, to 0.5 x 0.4 cm; rim thick; disc descending, whitish; valves 3(4), enclosed.

Figure 3. Seedlings of the new species of the "*E.* series *Foecundae*". A—*E. hypochlamydea* (*MIHB* 8726). B—*E. salicola* (*MIHB* 8692). C—*E. perangusta* (*MIHB* s.n. D—*E. latens* (*MIHB* 9046). E—*E. dissimulata* (*MIHB* 9140). F—*E. kumarlensis* (*MIHB* 8905).

Specimens examined. WESTERN AUSTRALIA: 11 miles S of Lake King, *R.D. Royce* 4164 (PERTH); prope Ravensthorpe, *C.A. Gardner* 13655 (PERTH); 2 miles NW of Ongerup, *K. R. Newbey* 125 (PERTH); Jerramungup, March 1967, *A.H. Bee* s.n. (PERTH); 35 km SW of Newdegate, January 1978, *J.M. Koch* s.n. (PERTH); 23.4 km from Rockhole road on Rawlinson road, *M.I.H. Brooker* 8077 (FRI, PERTH, NSW); 13 km N of Rolland's road on Field's road, *M.I.H. Brooker* 8672 (FRI, PERTH, NSW); 8.6 km N of North Kuendar road, *M.I.H. Brooker 9106, 9107 (FRI, PERTH, NSW, MEL).*

Distribution. From the Jerramungup region to north-east of Ravensthorpe, Western Australia, usually on white or yellowish white sand. It grows with a variety of other eucalypts including *E. tetragona* (R. Br.) F. Muell., *E. loxophleba* subsp. *gratiae* Brooker, *E. leptocalyx* Blakely, *E. flocktoniae* Maiden and *E. spathulata* subsp. *grandiflora* (Benth.) Johnson & Blaxell.

Flowering period. January-April

Etymology. The name is descriptive of the very narrow leaves at all stages (L. *per*—exceedingly, *angustus*—narrow).

Notes. Herbarium specimens of this species may be confused with *E. formanii* C. Gardner which, in contrast, is a tree or few-stemmed tall mallee with rough bark. The operculum of the bud of *E. perangusta* is conical.

4. **Eucalyptus latens** Brooker, sp. nov. (Figures 1, 2d, 3d)

Frutex "mallee" *Eucalypto foecundae* Schauer affinis a qua habitationi silvaticae, cortice laevi et foliis juvenilibus parvioribus glaucisque differt.

Typus: 0.6 km south of Pike's road north of North Bannister, 10 October 1985, *M.I.H. Brooker* 9046 (holo: PERTH; iso: FRI, NSW).

A *mallee* to 4 m tall with grey or coppery, smooth bark. *Juvenile leaves* sessile, opposite for many pairs, linear-oblong, to 4 x 0.8 cm, or narrowly elliptical and <1 cm wide, dull, glaucous. *Adult leaves* petiolate, alternating, narrowly lanceolate, to 9 x 0.7 cm, concolorous, glossy, green. *Inflorescences* axillary, unbranched, 7- to 11-flowered; peduncles flattened, 0.4-0.7 cm long. *Buds* pedicellate, fusiform, to 0.6 x 0.2 cm; operculum conical to slightly rounded. *Fruit* pedicellate, cupular, to 0.4 x 0.4 cm; rim thick; disc descending, whitish; valves 3(4), to rim level or enclosed.

Other specimens examined. WESTERN AUSTRALIA: type locality, *M.I.H. Brooker* 9344 (FRI, PERTH, NSW, MEL).

Distribution. E. latens consists of a single, almost pure stand of several hundred stems. There are two or three young trees of *E. wandoo* Blakely growing in the stand and one specimen of *E. falcata* Turcz. abutting it on the northern side.

Flowering period. Not known, but a few individual mallees were beginning to flower on 5th June 1986.

Etymology. The name refers to the populations being "hidden" in the jarrah forest (L. *latens*—hidden).

Notes. The linear-oblong, glaucous juvenile leaves distinguish it from other species in the series. The operculum of the bud is conical to slightly rounded.

5. **Eucalyptus dissimulata** Brooker, sp. nov. (Figures 1, 2e, 3e)

Frutex "mallee" *Eucalypto albidae* Maiden & Blakely affinis, a qua foliis juvenilibus ellipticis, non glaucis, stylo recto, et fructibus cupulatis differt.

Typus: 30.3 km N of Needilup just S of Rabbit Proof Fence road, 30 November 1984, *M.I.H. Brooker* 8748 (holo: PERTH; iso: FRI, NSW, MEL, AD).

A *mallee* to 4 m tall with dark grey and light grey, smooth bark. *Juvenile leaves* sessile, opposite for many pairs, elliptical, slightly concave above, 3-4.5 x 1-1.5 cm, dull, blue-green to greyish green. *Adult leaves* petiolate, alternating, lanceolate, to 11 x 1.3 cm, concolorous, glossy, green (less glossy than leaves of *E. albida*). *Inflorescences* axillary, unbranched, 7-flowered; peduncles flattened, widening at top, to 0.8 cm long. *Buds* shortly pedicellate, rhomboidal to ovoid, to 1.1 x 0.5 cm; operculum conical, brilliant red near flowering. *Style* straight or only slightly bent. *Fruit* shortly pedicellate, cupular, often with a sharp rib continuing from the pedicel, to 0.6 x 0.6 cm; rim moderately thick; disc prominently raised on its outer perimeter and finally descending, whitish; valves 3, to rim level or enclosed.

Other specimens examined. WESTERN AUSTRALIA: 3.8 km N of railway at Burngup, *M.I.H. Brooker* 8752 (FRI, PERTH, NSW); 48 km E of Pingrup, *M.I.H. Brooker* 8757 (FRI, PERTH, NSW); 11.3 km N of Reserve road on Magenta road, *M.I.H. Brooker* 8784 (FRI, PERTH, NSW); 10 km E along East Road, E of Pingrup, *M.I.H. Brooker* 8849 (FRI, PERTH, NSW); 29.1 km N of Needilup, *M.I.H. Brooker* 9124 (FRI, PERTH, NSW); c. 25 km NE of Pingrup, *M.I.H. Brooker* 9140 (FRI, PERTH, NSW), MEL).

Distribution. Needilup, Pingrup, Lake Magenta, Burngup areas, often on white sandplain with laterite. It occurs with a variety of other eucalypts including *E. calycogona* Turzc., *E. perangusta* Brooker, *E. scyphocalyx* Maiden & Blakely, and *E. conglobata* (R. Br. ex Benth.) Maiden and an undescribed species (*E.* ser. *Subcornutae*).

Flowering period. December-January.

Etymology and notes. The name (*L. dissimulatus*—pretending) alludes to the superficial similarities of *E. dissimulata* to *E. albida* from which it can be distinguished by the less glossy adult leaves, the elliptical juvenile leaves, the bright red opercula just before flowering, and the cup-shaped fruits which often have a sharp rib continuing from the pedicel and a prominent raised outer edge to the disc. The operculum of the bud is conical and contrasts with the usually slightly constricted operculum of *E. albida*. The fruit contrast with the somewhat obconical fruit of *E. albida*.

6. **Eucalyptus kumarlensis** Brooker, sp. nov. (Figures 1, 2f, 3f)

Arbor parva ad 10 m alta cortice laevi. Folia juvenilia sessilia, decussata, linearia, ad 5 x 0.6 cm. Folia adulta petiolata, alternantia, angusto-lanceolata, supra concava, ad 12 x 1 cm, nitentia, viridia. Inflorescentiae, axillares, 7, 9, 11-florae. Alabastra pedicellata, fusiformia vel rhomboidea, ad 0.6 x 0.3 cm, saepe quadrangulata basin versus. Opercula conica vel leviter rostrata. Stamina inflexa, fertilia. Fructus pedicellati, cupulati vel obconici, ad 0.4 x 0.4 cm.

Typus: 18 km W of highway on Lake King road (32° 41' S, 121 °22' E), 12 February 1985, *M.I.H. Brooker* 8843 (holo: PERTH; iso: FRI, NSW, MEL).

A *tree* to 10 m tall with white or coppery, smooth bark. *Juvenile leaves* sessile, opposite for many pairs, linear, concave above, to 5 x 0.6 cm, pale green. *Adult leaves* petiolate, alternating, narrowly lanceolate, to 12 x 1 cm, concolorous, glossy, green. *Inflorescences* axillary, unbranched, 7, 9, or 11-flowered; peduncles angular, to 1.2 cm long. *Buds* pedicellate, fusiform to rhomboidal, to 0.6 x 0.3 cm, often quadrangular towards the base; operculum conical to slightly beaked. *Fruit* pedicellate, cupular to obconical, to 0.4 x 0.4 cm; rim moderately thick; disc level to descending, whitish; valves 3(4), to rim level.

Specimens examined. WESTERN AUSTRALIA: 4 miles S of Salmon Gums, *R.D. Royce* 4055 (PERTH); 2.3 miles W of Norseman-Esperance road on Lake King road, *M.I.H. Brooker* 2510 (PERTH); 4.4 km W of Norseman-Esperance road on road to Lake

King, *M.I.H. Brooker* 5661 (FRI, PERTH, NSW); 18 km W of highway on Lake King road, *M.I.H. Brooker* 8843 (FRI, PERTH, NSW); 4.6 km W of Kumarl on Peak Charles road, *M.I.H. Brooker* 8905 (FRI, PERTH, NSW).

Distribution. South and south-west of Norseman, not associated with the numerous salt-lakes in the vicinity. West of Kumarl, the new species is associated with *E. eremophila* (Diels) Maiden.

Flowering period. January-March.

Etymology. The name refers to the district in which the species is most abundant.

Notes. The species has the appearance of a small salmon gum. The seedling leaves are very distinctive in the series, being linear and green. The operculum of the bud is conical to slightly beaked.

Acknowledgements

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The *Westringia dampieri-W. eremicola-W. rigida* complex (Labiatae)

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Abstract

Conn, Barry J. The *Westringia dampieri-W. eremicola-W. rigida* complex (Labiatae). Nuytsia 6(3): 335-349 (1988). The relationship between *Westringia dampieri, W. eremicola* and *W. rigida* is discussed. *W. grevillina, W. rigida* var. *dolichophylla* and *W. senifolia* var. *canescens* are reduced to synonymy of *W. dampieri. W. rigida* var. *brachyphylla* and var. *brevifolia* are regarded as indistinct from typical *W. rigida. W. eremicola* var. *quaterna* is not formally recognized as distinct from typical *W. eremicola.* The relationship between *W. eremicola, W. cremnophila* and *W. longifolia* is discussed. Notes on the type of *W. longifolia* are provided.

Introduction

While preparing an account of *Westringia* for the recent "Flora of South Australia" (Conn 1986) it became apparent that there are considerable taxonomic problems in this genus. In an attempt to understand the South Australian species of *Westringia*, it was necessary to consider many of the species of this genus occurring outside this region.

The most recent complete account of the genus is by Boivin (1949). Although this treatment is a commendable effort considering the circumstances under which it was done (see Boivin 1949, p. 99), much of the present-day confusion (e.g. Eichler 1965, Costermans 1981) has, in part, resulted from Boivin's treatment. In Boivin's defence, it must be pointed out that the amount of herbarium material available for study has increased significantly since 1944. The problems he faced were further compounded because much of the type material was not available for examination during the second World War and he had insufficient time for field work.

The increased amount of herbarium material has emphasized the complexities of the genus far beyond that suspected by Boivin (1949) and many of the more recent flora accounts. It is now obvious from this study that detailed population studies are essential, so that within-population and between-population morphological variation can be evaluated.

This paper presents my investigations into the relationship between *W. dampieri, W. eremicola* and *W. rigida.* The conclusions presented here are tentative since they represent initial hypotheses which have been derived from relatively inadequate data. Although I have begun population studies of this complex, it will be several years before sufficient data are available to allow a detailed re-evaluation. The purpose of this paper is twofold: (1) to bring the taxonomic problems of this complex to the attention of the taxonomic community so that some misconceptions regarding these taxa can (at least in part) be corrected; (2) to stimulate other plant collectors to collect these taxa on a population basis, with adequate field observations, so that the planned population studies will be as representative of the group as possible.

These investigations have been based on material from the following herbaria (abbreviations as designated in Holmgren et al. 1981): AD, BM, C, K, MEL, PERTH.

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Methods and presentation

The measurements of the morphological characters and the subsequent descriptions were taken from 650 herbarium specimens. In the descriptions, those character states which occur in fewer than 10% of the individuals (of the relevant taxon) are enclosed by parentheses. Parentheses are also used to enclose rarely occurring character states which may be present in an otherwise typical individual specimen.

General terminology follows Lawrence (1955), Porter et al. (1973), and Stearn (1973). Terminology for plane shapes follows Ball et al. (1962). Author and literature abbreviations follow Stafleu & Cowan (1976, 1979, 1981, 1983, 1985).

The distribution summary and the selected citation of specimens examined are grouped according to various regional subdivisions. The subdivisions used for the States are: for Queensland I have followed the pastoral divisions as in Contr. Queensl. Herb. 19 (1975) back end paper, for New South Wales those of Jacobs & Pickard (1981) (which is modified from Anderson 1961), for Victoria those of Cochrane et al. (1968), for South Australia those of Laut et al. (1977a-f), and for Western Australia those of Beard (1980).

Morphological characters

Bentham noted that 'the species [of *Westringia*] are so closely allied, and run so much into each other as to render it exceedingly difficult to assign to them any tangible characters' (Bentham 1870, p. 127). This has proved to be particularly true for the three taxa discussed in this paper.

The type of field observations required for *Westringia* are the same as those needed for all Labiatae. As similar observations are required for both *Westringia* and *Prostanthera*, Conn (1980) should be referred to for a discussion of the type of observations required. The lack of useful field observations on most of the herbarium collections of *Westringia* has made it difficult to evaluate many characters. Only about 30% of the collections examined have information other than the locality of the collection. Even less have information which can be used to evaluate the taxonomic value of certain characters which are not readily represented by herbarium specimens.

Boivin (1949) discussed the usefulness of various morphological characters and his paper should be consulted for further details.

Taxonomic characters currently used

The characters which have been most frequently used to distinguish between the taxa of this complex are: the number of leaves per whorl, the size and shape of the leaves, and the size of the calyx lobes.

The number of leaves per whorl. Although the number of leaves per whorl is a useful character for delimiting certain *Westringia* species (see Boivin 1949), it appears to be of limited taxonomic value in this complex. For example, some specimens of *W. eremicola* have 3 and 4 leaves per whorl (namely *Chipstone* 25, *Copley* 4504, *Hunt* 233). *W. eremicola* and *W. rigida* usually have 3 leaves per whorl. The Western Australian populations of *W. dampieri* usually have either 3 or 4 (rarely 5) leaves per whorl, whereas the South Australian populations ('*W. grevillina*') appear consistently to have 3 leaves per whorl. So, because of the overlap and the variation even within plants, it is concluded that the number of leaves per whorl is useful as a secondary feature which may confirm an initial determination within this complex.

The size and shape of leaves. With respect to this complex, there is a general tendency for *W. rigida* to have smaller leaves than *W. eremicola* and *W. dampieri.* However, many collections are difficult to classify into any particular taxon on the basis of leaf size. For practical reasons it was found that size (such as length) was a difficult character to use because it appears to be readily modified by environmental factors. Furthermore, it is difficult to ascertain if mature leaves are present in herbarium specimens.

It was found that within a single collection the lamina length to width ratio does not vary as much as either the length or the width. Therefore, the lamina length to width ratio proved to be a useful and reliable way of quantifying leaf shape. However, a consideration of this ratio does not produce recognizably disjunct species (refer abcissa of Figure 1). The leaf length of *W. rigida* is usually less than 9 times the width; in *W. dampieri* the leaf length is usually between 8 and up to about 20 times the width; whereas *W. eremicola* has a leaf length which is usually greater than 6 and up to 30 times the width. The extent of the overlap is such that this character can only be used as a supplementary taxonomic character. This character is further discussed below, with reference to Figure 1.

The size of the calyx lobes. The size of the calyx lobes, usually relative to the size of the calyx tube, has been regarded as taxonomically useful by several authors (see Bentham, in Candolle 1848; Bentham 1870; Boivin 1949; Robertson, in Black 1957; Curtis 1967; Willis 1973). The calyx lobes of *W. rigida* are usually regarded as about one third the length of the calyx tube (Curtis 1967; Robertson, in Black 1957; and Willis 1973). Blackall & Grieve (1965) regarded the calyx lobes of *W. dampieri* as about one fifth the length of the calyx tube. The calyx lobe to tube ratio of *W. eremicola* is regarded as greater than 0.5 (Boivin 1949) and often 1 (Willis 1973). It can be seen from Figures 1A & B (ordinate axis) that the various calyx lobe to tube ratios mentioned above do not adequately distinguish between *W. eremicola, W. dampieri* and *W. rigida.*

I have plotted the calyx lobe to calyx tube ratio against lamina length to width ratio (Figure 1). Figure 1A summarizes the spatial limits, with respect to these two features, for the three species of this complex. Although most collections can be classified using these two characters, about 36% of the collections examined occur in the overlap zones. The complexity of the overlap zones is shown in Figure 1B.

Other useful taxonomic characters

This study has revealed additional characters which offer further insights into the taxonomy of this complex. They are: corolla size, colour and markings; habit; presence or absence of indumentum on staminodal filaments, plus the size of the staminodal lobes; and petiole length. These additional characters which appear to assist in the delimitation of the three taxa, are discussed below.

Corolla. Both *W. eremicola* and *W. rigida* usually have smaller corollas than *W. dampieri* (6-8.5 mm long cf. 8-12 mm long). In particular, the adaxial median lobe-pair of *W. eremicola* is smaller than both *W. rigida* and *W. dampieri* (namely *W. eremicola* 2.6-3.8 mm long, 2.6-3.9 mm wide; *W. rigida* 3.2-4.4 mm long, 4.2-5 mm wide; *W. dampieri* 7.2-8 mm long, 6.4-8 mm wide).

W. rigida have white corollas (often with mauve tinge) with orange to orange-brown markings. However, *Gardner* 2100 and *Hunt* 2692 record lilac and mauve corollas which lack markings. *W. eremicola* have lilac, mauve or purple, rarely white (*Sharrad* 1392) corollas with or without markings. *Conn* 1041 noted mauve and white flowers in a population of *W. eremicola* at Monarto South, South Australia. In *W. dampieri* the corolla may not be very useful since it is either white with purple, red, yellow and/or yellow-brown markings, or pale purple, pale mauve to lilac without markings. The corolla colour and markings may be of some use for distinguishing *W. rigida* from *W. eremicola,* but for the complex as a whole, it would appear to be, at best, of secondary importance.

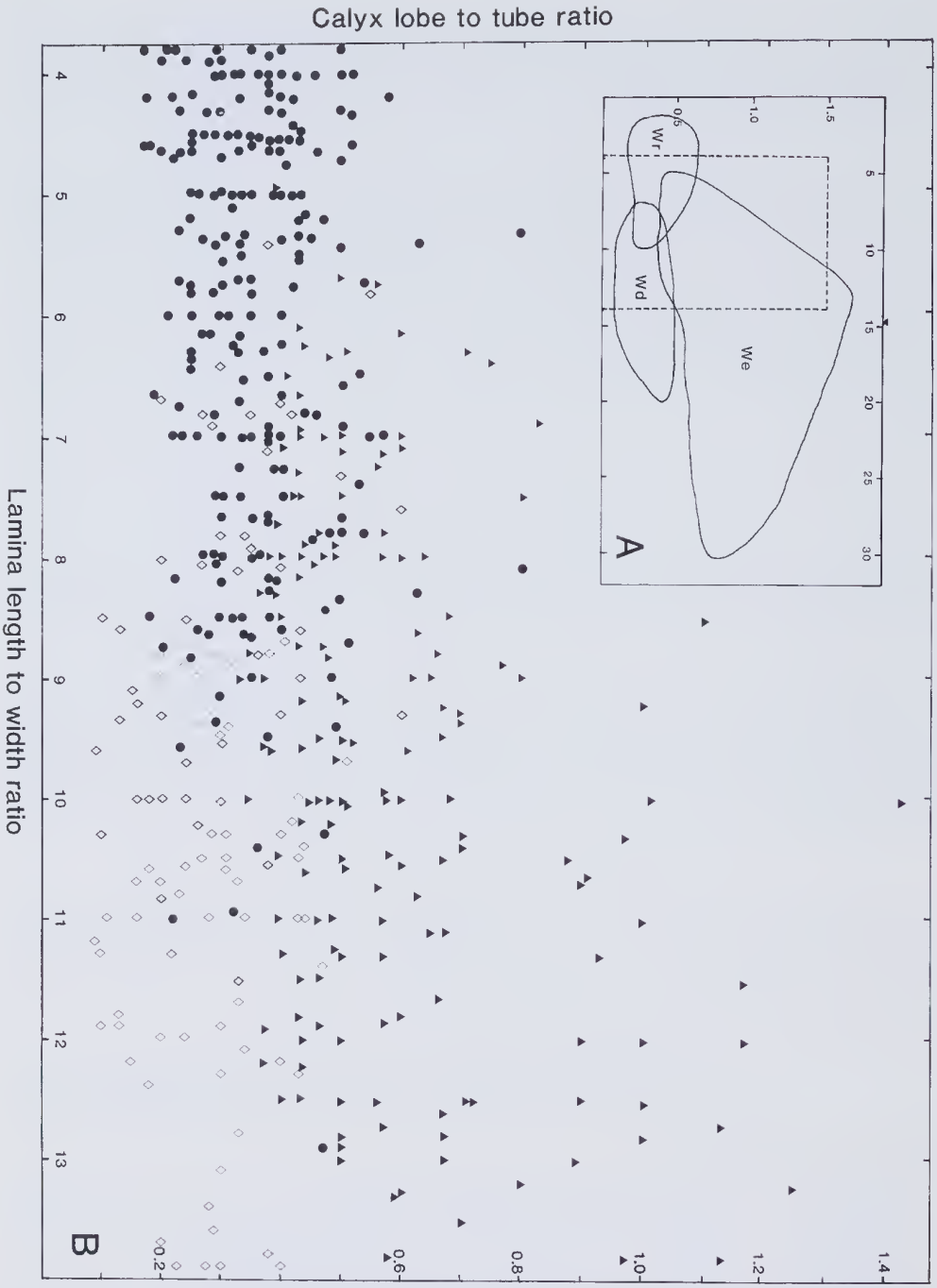

Figure 1. Calyx lobe to tube ratio compared with lamina length to width ratio for *Westringia dampieri-W. eremicola-W. rigida* complex. A. Summary of total scattergram for *W. dampieri* (Wd), *W. eremicola* (We), and *W. rigida* (Wr) (area enclosed by dashed line is shown in detail in Figure 1B). B. Scattergram of 'overlap zone'; solid dot = *W. rigida*, solid triangle = *W. eremicola*, open diamond = *W. dampieri*.

Habit. The habit seems likely to provide the most useful additional information to aid in the classification of these species. Although habit is a difficult character(s) to quantify, the following qualitative differences have been observed. *W. eremicola* is a slender, or sometimes bushy shrub which has an overall 'soft' appearance. The leaves and branches are ascending, usually at an angle less than 45° to the next higher order axis. For photographs of this species refer G. & P. Althofer (1980, p. 349) and Costermans (1981, p. 269 [figure labelled as '*Westringia grevillina* (? *eremicola*)']). *W.dampieri* is usually a very dense shrub. The shrub appears compact, partly because of the relatively short internodes. This species also tends to be slightly 'fleshy', which is possibly correlated to its more or less coastal environment. *W. rigida* is usually a multistemmed divaricate or intricate shrub, reasonably compact and often hemispherical in shape. The branches are rigid and often somewhat tangled. The rigid leaves are often patent. For photographs of this species refer Cunningham et al. (1982, p. 581) and G. & P. Althofer (1980, p. 348).

Staminodes. The staminodal filaments of *W. rigida* are glabrous or hairy, whereas those of *W. eremicola* and *W. dampieri* are hairy, at least at the base. The staminodal lobes show small differences in size between the three taxa (namely *W. rigida* 0.4-0.5 mm long, *W. eremicola* 0.6-0.8 mm long and *W. dampieri* 0.9-1 mm long). These characters appear to be taxonomically useful, even though further evaluation is necessary.

Petiole length. W. rigida has sessile leaves whereas *W. dampieri* and *W. eremicola* are petiolate (petiole 0.3-0.5 mm long and 0.5-0.7 mm long, respectively). Although this character appears to be taxonomically useful, in practice it is sometimes difficult to distinguish between leaves which are sessile and those which are very shortly petiolate (i.e. about 0.3 mm long).

Conclusion

At present, the morphological evidence suggests that many (apparently) minor character differences combine to maintain *W. dampieri, W. eremicola* and *W. rigida* as distinct from each other. I have been unable to identify one or two major differences which will consistently differentiate between these taxa. Extensive population studies are required so that these characters can be more thoroughly evaluated.

Key to species

1a. Leaves sessile, usually subpatent (sometimes spreading to recurved), ovate to narrowly ovate, 1.9-5.2(-9.8) mm long, subpungent (mucro c. 0.8 mm); corolla white with dots on inner surface; calyx lobe to tube ratio (0.2-)0.4-0.5; shrub intricate or divaricate .....2. *W. rigida*

1b. Leaves with petiole 0.3-0.7 mm long, spreading to recurved, ovate, narrowly ovate, narrowly oblong, to linear, (4-)6-26(-40) mm long, usually mucronate (mucro 0.3-0.5 mm long); corolla white or purple, lilac or mauve, dots present or absent; calyx lobe to tube ratio (0.1-) 0.2-0.6(-0.9); shrub with suberect to spreading branches

2a. Leaf lamina (8-)13-26(-40) mm long, (1-)1.5-3 mm wide; petiole 0.3-0.5 mm long; calyx lobes (0.5-)0.8-1.9 mm long; corolla 8-12 mm long; corolla adaxial median lobe-pair 7.2-8 mm long, 6.4-8 mm wide; staminodal lobes 0.9-1 mm long; calyx lobe to tube ratio (0.1-)0.2-0.5 (-0.6) .....1.*W. dampieri*

2b. Leaf lamina (4-)6-12(-15) mm long, (0.6-)0.8-1.3 20 mm wide; petiole 0.5-0.7 mm long; calyx lobes (1-)1.3-3(-5.3) mm long; corolla 6.5-8.5 mm long; corolla adaxial median lobe-pair 2.6-3.8 mm long, 2.6-3.9 mm wide; staminodal lobes 6-0.8 mm long; calyx lobe to tube ratio (0.3-)0.4-0.6(-0.9) .....3.*W. eremicola*

1. **Westringia dampieri** R. Br., Prodr. 501 (1810); J.D. Hook., Bot. Mag. t. 3308 (1834); Benth., Labiat. Gen. Spec. 458 (1834); Bartl. in Lehmann, Pl. Preiss. 1: 361 (1845); Benth. in DC., Prodr. 12: 570 (1848); Fl. Austral. 5: 129 (1870); F. Muell., Fragm. 9: 163 (1875); Boivin, Proc. Roy. Soc. Queensland 60: 107 (1949 [as 1950]); Robertson in J.M. Black, Fl. S. Austral. 2nd. edn, 4: 742, fig. 1064 (1957); Blackall & Grieve, Western Austral. Wildfl. 3: 577 (1965); J.S. Beard, Descr. Cat. Western Austral. Pl. 94 (s. dat. [Oct. 1965]); G. & P. Althofer, Austral. Pl. 10: 361 (1980) [as '*Westringia dampierii*']; Grieve (ed.), Blackall & Grieve, Western Austral. Wildfl. 3B: 430 (1981). *Lectotype* (here chosen): *R. Brown* s.n. [*J.J. Bennett* 2381], anno 1802-5 [8 Dec. 1801-1 Jan. 1802 (Stearn 1960)], King Georges Sound, Western Australia (lecto: BM, upper left specimen; isolecto: BM, upper centre & right specimens).

W. cinerea R. Br., Prodr. 501 (1810); J.D. Hook., Bot. Mag. t. 3307 (1834); Benth. in DC., Prodr. 12: 570 (1834). *Lectotype* (here chosen): *R. Brown* s.n. [*J.J. Bennett* 2383], anno 1802-5 [29 Jan. 1802-13 Feb. 1802], Bay 3 - 4 - 5 - 7 [Fowler's Bay, Petrel Bay, Franklin Bay, Waldgrave Island (Stearn 1960)], South Australia (lecto: BM, third specimen from left; isolecto: BM - other specimens on sheet [excluding type]).

W. grevillina F. Muell., Defn. Austral. Pl. 16 ([July (Seberg 1986)] 1855); Trans. Phil. Soc. Victoria 1: 49 ([September (Aston 1984)] 1855); J. Bot. Kew. Gard. Misc. 8: 169 (1856); Boivin, Proc. Roy. Soc. Queensland 60: 106 (1949 [as 1950]); G. & P. Althofer, Austral. Pl. 10: 363 (1980). *Lectotype* (here chosen): *Wilhelmi* s.n., s. dat., Cape Donnington and Tungetta, Port Lincoln, South Australia (lecto: MEL 614327; isolecto: MEL 614328 & MEL 614329).

W. rigida R. Br. var. *dolichophylla* Ostenf., Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3: 112 (1921); Blackall & Grieve, Western Austral. Wildfl. 3: 577 (1965); G. & P. Althofer, Austral. Pl. 10: 364 (1980); Grieve (ed.), Blackall & Grieve, Western Austral. Wildfl. 3B: 429 (1981). *Lectotype* (here chosen): *Ostenfeld* 977, 29.x.1914, Geraldton (lecto: C - lower specimen; isolecto: C - upper specimens, PERTH).

W. senifolia F. Muell. var. *canescens* Benth., Fl. Austral. 5: 130 (1870). *Lectotype* (here chosen): *Maxwell* 262, s. dat., Phillips Ranges, Western Australia (lecto: MEL 614549, left specimen; isolecto: MEL 614549, right specimen).

[*W. senifolia* auct. non F. Muell. (1855); Blackall & Grieve, Western Austral. Wildfl. 3: 578 (1965).]

Small shrubs 0.3-1(-1.3) m high. *Branches* triangular to quadrangular, or subterete, ± smooth or internodes with raised ridges from axil of leaf to next more distal node, densely hairy (c. 100-230 hairs/mm^2), hairs appressed, antrorse, simple, c. 0.2 mm long. *Leaves* in whorls of 3 or 4(or 5), spreading to recurved, abaxial surface and petiole densely hairy (150-200 hairs/mm^2), adaxial surface densely hairy basally, sparsely hairy to glabrescent distally; *petiole* 0.3-0.5 mm long; *lamina* narrowly ovate or narrowly oblong to linear, (8-)13-26(-40) mm long, (1-)1.5-3 mm wide (lamina length to width ratio (4-)7.5-15(-19.7), length of maximum width from base to total lamina length ratio up to c. 0.1), base cuneate, margin entire and recurved such that only midrib of abaxial surface visible, apex mucronate (mucro 0.3-0.5 mm long); venation not visible, midrib slightly raised on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic. *Pedicel* 0.2-0.8 mm long, densely hairy; *prophylls* inserted at base of calyx, narrowly ovate to narrowly oblong, 1.4-1.5 mm long, 0.2-0.3 mm wide (length to width ratio 5-7), densely hairy, base narrowly cuneate or prophylls not restricted at base, margin incurved, apex obtuse. *Calyx* green, mid-vein of each sepal thickened to form a ridge from base to apex of each calyx lobe, outer surface densely hairy, hairs appressed, antrorse, c. 0.2 mm long; *tube* (2.5-)3.3-4.4(-5.5) mm long, inner surface glabrous; *lobes* depressed to very broadly triangular, (0.5-)0.8-1.9 mm long, 1.1-2.3 mm wide (length to width ratio 0.5-0.8), inner surface moderately to densely hairy, apex obtuse to subacute; (calyx lobes to tube ratio (0.1-)0.2-0.5(-0.6)). *Corolla* 8-12 mm long, white with purple, red, yellow and/or brown dots medially on abaxial surface of tube and mouth, or pale purple, pale mauve to lilac with dots absent; outer surface

glabrous basally, sparsely hairy on distal part of tube, densely hairy on lobes, hairs c. 0.2 mm long, ± appressed; inner surface sparsely to moderately hairy, hairs 0.3-0.7 mm long, ± erect and spreading; *tube* 4-5.5 mm long, tubular, dilated basally around ovary and in throat such that tube appears slightly funnelform distally, diameter at mouth c. 1.8-2 mm; *abaxial median lobe* broadly oblong to ± oblong or subelliptic to ± ovate, 3-3.5 mm long, 1.8-2.5 mm wide (length to width ratio 1.4-1.7), apex rounded and ± irregular; *lateral lobes* subtriangular to ± ovate, 5-5.5 mm long, 2.5-3 mm wide (length to width ratio 1.7-2), apex rounded to obtuse, irregular; *adaxial median lobe-pair* 7.2-8 mm long, 6.4-8 mm wide distally, bilobed (sinus 2-2.6 mm long), each half of lobe-pair very broadly ovate to broadly obovate (lobe length to width ratio 0.7-1) and each with a ± rounded and irregular apex. *Androecium* inserted in mouth. *Staminal filaments* 1.7-2 mm long, hairy; anthers 1-1.2 mm long, lobe with a minute basal acumen up to 0.1 mm long, or acumen absent. *Staminodal filaments* 1-1.5 mm long, hairy; staminodal lobes white, 0.9-1 mm long. *Disc* cylindrical, c. 0.2 mm high. *Pistil* 6.5-8 mm long; ovary c. 0.6-1 mm long; style 6-7 mm long; stigma lobes up to c. 0.3 mm long. *Mericarps* 2-2.5 mm long, distally 0.7-0.8 mm extended beyond base of style; seeds ± flattened, narrowly obovate in outline, 1-1.3 mm long, glabrous.

Selected specimens examined (150 examined). SOUTH AUSTRALIA: Mt Lofty Block: Kangaroo Island (Amberley): *Andrew* s.n., 8.v.1914, Kingscote (AD). - Eyre and Yorke Peninsulas: Southern Highlands and Plains (Peake Bay): *Robjohns* s.n., 24.x.1967, Point Bolingbroke (AD); (Lincoln): *Wilson* 327, 8.x.1958, Stamford Hill (AD): West Coast (Polda): *Willis* s.n., 26.viii.1947, Elliston Beach (MEL); (Streaky Bay): *Cooper* s.n., 7.v.1955, Cape Bauer (AD): Central Mallee Plains and Dunes (Ceduna): *Wilson* 1521,10.ix.1960, Thevenard (AD, MEL).

WESTERN AUSTRALIA: Eremaean (Coolgardie): *Wilson* 7709, 4.ix.1968, near Pt Dover (PERTH); (Carnarvon): *Kinnear* (WAWRC)D, 24.iv.1979, Dorre Island (PERTH). - South-West (Roe): *Andrews* s.n., -.x.1979, Salmon Gums (PERTH); (Eyre): *Weston* (& *Trudgen*) 86811, 15.xi.1973, NE part of Middle Island, Recherche Archipelago (PERTH); (Darling): *Alexander* B.1501, -.xii.1919, Garden Island (PERTH); (Irwin): *Ashby* 3261, 10.vii.1970, East Wallabi Island, Houtman Abrolhos (PERTH).

Distribution. South Australia and Western Australia.

Ecology. This species occurs in coastal situations on beach sands, sand dunes or limestone cliffs, and on small islands. It grows in sandy soils which are usually calcareous-derived or sometimes granitic-derived. It rarely occurs in clayey soils.

Typification. The labels and specimens of Wilhelmi's collection of *Westringia grevillina* have been mounted on three separate herbarium sheets (namely MEL 614327 - 614329). Only MEL 614329 has a label in Mueller's hand.

Notes. The interpretation of *W. grevillina* has resulted in considerable confusion. Mueller (1875) reduced this taxon to the synonomy of *W. dampieri.* Boivin (1949) reinstated *W. grevillina* and excluded *W. eremicola* from South Australia without comment. Robertson (in Black, 1957) followed Mueller's interpretation without discussing Boivin's opinion. Subsequently, Eichler (1965) assumed from Boivin's work that the taxon known as '*W. eremicola*' in South Australia was *W. grevillina.* I have concluded that *W. grevillina* is a synonym of *W. dampieri* and that *W. eremicola* does occur in South Australia (for further discussion of the latter species refer 'Notes' under *W. eremicola).* Robertson (in Black, 1957) describes *W. dampieri* (of South Australia [as '*W. grevillina*']) as sometimes having 4 leaves per whorl. In all the material that I examined the South Australian populations appeared consistently to have 3 leaves per whorl. *W. dampieri* (as occurring in Western Australia) has mostly 4 leaves per whorl. However, some specimens of the latter populations have both 3 and 4 leaves per whorl, and two collections (namely *George* 139 and *Newbey* 815) have 5 leaves per whorl. The number of leaves per whorl is thought to be of little taxonomic significance in this species.

Mueller (1875), and more recently G. & P. Althofer (1980) regarded *W. senifolia* var. *canescens* from Western Australia as a distinct taxon from typical *W. senifolia* from Victoria. Boivin (1949) regarded *W. senifolia* var. *canescens* as an indistinct form of typical *W. senifolia*. This interpretation is regarded as incorrect since the two taxa are readily distinguishable. *W. senifolia* has leaves which are moderately to densely hairy on all surfaces (although the abaxial surface is more densely hairy than the adaxial surface), with spreading hairs about 0.5-1 mm long. The branches have the same type of indumentum. *W. senifolia* var. *canescens* has densely hairy to glabrescent leaves. The indumentum of the leaves of the latter taxon is sometimes restricted to the abaxial surface. The hairs of the leaves and branches are appressed and 0.2-0.3 mm long. This latter taxon appears to be a small-leafed form of *W. dampieri*.

Conservation status. Considered not at risk.

2. **Westringia rigida** R. Br., Prodr. 501 (1810); Benth. in DC., Prodr. 12: 570 (1848); Fl. Austral. 5: 129 (1870); Rodway, Tasman. Fl. 150 (1903); J.M. Black, Fl. S. Austral. 3: 494, fig. 200E & F (1926); Ewart, Fl. Victoria 980 (1931 [as 1930]); Boivin, Proc. Roy. Soc. Queensland, 60: 107 (1949 [as 1950]); Robertson in J. M. Black, Fl. S. Austral. 4:742, figs 1038E & F, 1063C (1957); Blackall & Grieve, Western Austral. Wildfl. 3: 577 (1965); Beard. Desc. Cat. Western Austral. Pl. 94 (s. dat. [Oct. 1965]); Curtis, Student's Fl. Tasmania. 3: 555 (1967); Willis, Handb. Pl. Victoria, 2: 585 (1973 [as 1972]); G. & P. Althofer, Austral. Pl. 10: 364, & tt. (1980); Grieve (ed.) in Blackall & Grieve, Western Austral. Wildfl. 3B: 429 (1981); Haegi in J. Jessop (ed.), Fl. Central. Austral. 311, fig. 413 (1981); Costermans, Native Trees & Shrubs SE Austral. 268 & t. (1981); Cunningham et al., Pl. W. New S. Wales 581 & t. (1982 [as 1981]). *Lectotype* (here chosen): *R. Brown* s.n. [*J.J. Bennett* 2382], anno 1802-5 [January 1802 (Stearn 1960)], Bay 3 South Coast [Goose Island Bay, Western Australia (Stearn 1960)] (lecto: K - lower left specimen; isolecto: K - other specimens on sheet excluding type).

W. rigida var. *brevifolia* Benth. in DC., Prodr. 12: 570 (1848). *Lectotype* (here chosen): *Drummond* 194, s. dat., Swan River (lecto: K - central left specimen; isolecto: K - upper left and right specimens).

W. rigida var. *brachyphylla* Ostenf., Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3: 112 (1921); Blackall & Grieve, Western Austral. Wildfl. 3: 577 (1965); G. & P. Althofer, Austral. Pl. 10: 364 (1980); Grieve (ed.) in Blackall & Grieve, Western Austral. Wildfl. 3B: 429 (1981). *Lectotype* (here chosen): *Ostenfeld* 982, 7.x.1914, Kalgoorlie (lecto: C - left specimen; isolecto: AD, C - centre and right specimens, MEL, PERTH).

Small shrubs, 0.3-0.6(-1) m high. *Branches* subterete with two slightly raised lateral ridges, sparsely to densely hairy distally, glabrous basally; hairs appressed, simple, antrorse, c. 0.3 mm long. *Leaves* in whorls of 3(or 4), spreading to recurved, sessile; *lamina* ovate to narrowly ovate, 1.9-5.2(-9.8) mm long, 1-1.7(-2.2) mm wide (lamina length to width ratio (1.5-)2-7(-8.2), length of maximum width from base to total lamina length ratio 0.1-0.6), rigid, sparsely to moderately hairy, hairs usually persistent on abaxial surface, but adaxial surface becoming sparsely hairy or rarely glabrous, base rounded to broadly obtuse, margin entire and recurved such that abaxial surface almost concealed, apex submucronate to subpungent (rigid point c. 0.8 mm long); venation not visible, midrib slightly raised on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic. *Pedicel* 0.2-0.7(-1) mm long, densely hairy; *prophylls* inserted near base of calyx, narrow, ovate to suboblong, 1-1.5 mm long, 0.3-0.5 mm wide (length to width ratio 2.7-5.6), moderately to densely hairy, base narrowly-cuneate, margin often slightly incurved, apex obtuse. *Calyx* green, mid-vein of each sepal thickened to form a ridge from base to apex of each calyx lobe, outer surface densely hairy, hairs appressed, antrorse, less than 0.2 mm long; tube 2.6-3.6 mm long, inner surface glabrous; lobes depressed triangular to very broadly triangular, (0.6-)0.9-1.6 mm long, 1-1.7 mm wide at base (length to width ratio 0.7-1), inner surface moderately to densely hairy, apex subacute; (calyx lobes to tube ratio (0.2-)0.3-0.5). *Corolla* 6-7 mm

long, white, often with a mauve tinge, with orange to orange-brown dots medially on abaxial surface of tube and mouth, dots also on lateral and abaxial lobes; outer surface moderately hairy, hairs ± appressed, 0.1-0.3 mm long; inner surface sparsely to moderately hairy, hairs (0.2-)0.3-0.4 mm long, ± erect and spreading; *tube* 3.3-5.2 mm long, tubular, dilated basally around ovary and in throat such that tube appears funnelform distally, diameter at mouth c. 2 mm; *abaxial median lobe* ± oblong, 3.2-3.5 mm long, 2-2.2 mm wide (length to width ratio 1.4-1.6), apex rounded and ± irregular; *lateral lobes* ± oblong, often slightly constricted 1-1.5 mm above base, 1.5-3.3 mm long, 1.4-2 mm wide (length to width ratio 1-1.6), apex rounded and ± irregular; *adaxial median lobe-pair* 3.2-4.4 mm long, 4.2-5 mm wide distally, bilobed (sinus 1-1.2 mm long), each half of lobe-pair ovate to broadly ovate (lobe length to width ratio 0.8-0.9) and each with a rounded apex. *Androecium* inserted in corolla mouth. *Staminal filaments* 1.3-1.5 mm long, glabrous; *anthers* 0.7-0.8 mm long, lobe with a minute basal acumen 0.1-0.2 mm long. *Staminodal filaments* 0.4-0.9 mm long, usually glabrous; *staminodal lobes* white, 0.4-0.5 mm long. *Disc* cylindrical, 0.4 mm high. *Pistil* c. 6 mm long; ovary 0.7-1 mm long; style c. 5 mm long; stigma lobes 0.2-0.3 mm long. *Mericarps* 1.5-1.8 mm long, distally 0.7 mm extended beyond base of style; seeds ± flattened, narrowly obovate in outline, c. 1.1 mm long.

Selected specimens examined (380 examined). QUEENSLAND: Warrego: *Barker* 4856, 25.ix.1984, 4-5 km SSE of road between Yowah and Black Gate Opal Field Store (AD, MEL).

NEW SOUTH WALES: North Western Plains: *Day* s.n., anno 1878, upper Darling River (MEL 614660, MEL 61674); South Western Plains: *Beckler* s.n., 15.ix.1860, at Lake Yanga, near Balranald (MEL 614612); South Far Western Plains: *Phillips* CBG 17331, 31.viii.1962, 19 miles from Euston (AD).

VICTORIA: Mallee: *Corrick* 7375, 1.viii.1981, Stewart Flora & Fauna Reserve, Red Cliffs area (MEL); *Morton* 321, 30.viii.1979, Walpeup (MEL); (Big Desert): *Beauglehole* 28762A, 1.x.1968, Duttack Track, Wyperfeld National Park (MEL); Northern Plains: *Muir* 911, 20.x.1959, c. 6 miles N of Bagshot (AD, MEL).

SOUTH AUSTRALIA: Murray Mallee: Murray Lakes (Lake Alexandrina): *Donner* 6759, 20.x.1978, turnoff to Cookes Plaines (AD - mixed collection); Northern Calcarenite Ridges and Plains (Cantana): *Sharrad* 1230, 12.x.1961, 1 mile E of Coomandook (AD); (Coonalpyn): *Williams* s.n., 26.x.1952, Coonalpyn (AD); South-east Mallee Heathlands (Karoonda): *Southcott* & *Fischer* s.n., 25.x.1971, c. 8 km E of Lameroo (AD); (Moorlands): *Sharrad* 1158, 4.ix.1961, Naturi (AD); (Wood Hill): *Ising* s.n., 4.ix.1958, Murray Bridge (AD); (Lower Murray): *Sharrad* 1302, 24.vii.1962, 10 miles N of Tailem Bend (AD); Upper Murray Lands (Punthari): *Donner* 1104, 4.viii.1964, c. 10 km ENE of Mannum (AD); (Blanchetown): *Whibley* 7176, 16.x.1975, c. 19 km NNE of Morgan (AD); (Holder): *Wheeler* 462, 18.ix.1967, c. 16 km WSW of Waikerie (AD); (Renmark): *Sharrad* 1172, 5.ix.1961, near Glossop, on Morgan-Berri Rd (AD); (Parcoola): *Whibley* 3653, 26.ix.1971, c. 12 km N of Overland Corner (AD); (Mt Mary): *Orchard* 190, 29.iii.1968, c. 3 km SW of Bower (AD); (Sutherlands): *Boehm* 369, 14.viii.1962, c. 3km WSW of Sutherlands (AD). Mt Lofty Block: Peninsula Uplands (Sandergrove): *Fagg* 511, 4.iii.1968, Ferris MacDonald (AD); (Hahndorf): *Cooper* s.n., -.vii.1941, c. 3 km S of Tungkilla (AD); (Barossa): *Behr in herb. Sonder* s.n., 29.xi.1848, Salt Creek (c. 13 km NE of Gawler) (MEL 614601). Eyre and Yorke Peninsulas: West Coast (Kappawanta): *Specht* 2068, 8.xii.1959, c. 120 km N of Pt Lincoln (AD); Central Mallee Plains and Dunes (Hincks): *Alcock* 1594, 29.x.1967, c. 3 km W of Mt Verran (AD); (Cleve): *Eichler* 19168, 27.viii.1952, c. 12 km NE of Arno Bay (AD); (Pinkawillinie): (Midgee): *Whibley* 246, 1.x.1958, between Whyalla and Cowell (AD); *Baker* s.n., 29.viii.1952, 4 miles W. of Bookaloo (AD); (Kyancutta): *Hilton* s.n., 19.viii.1955, 6 miles W of Wudinna (AD); (Wirrula): *Symon* s.n., 30.ix.1959, 13 miles N of Koonibba Siding (AD); Northern Myall Plains (Buckleboo): *Wilson* 191, 3.x.1958, c. 74 km W of Whyalla (AD); (Whyalla): *Cleland* s.n., 1.ix.1944, Whyalla Knob (AD); Southern Yorke Peninsula (Urania): *Cleland* s.n., 9.viii.1953, Port Victoria (AD); Gulf Plains (Weetulta): *Blaylock* 802, 23.ix.1967, c. 6 km SSE of Moonta (AD); (Boor Plains); *Copley* 1302, 11.v.1967, Point Riley (AD); (Mallala): *Cooper* s.n., 8.ix.1964, Goyder

Siding to Bowans (AD); (Barung): *Cooper* s.n., 23.viii.1966, Hummock Mt (AD); (Glendella): *Chinnock* 1433, 25.vii.1974, Mt Grainger (AD). Flinders Ranges: Northern Complex (Yudnamutana): *Chinnock* 321, 20.v.1973, 2 km N of Mudlamutana Well (AD). Western Pastoral: Gawler Uplands (Gawler): *Bates* s.n., 10.x.1976, Scrubby Peak (AD); (Koolcutta): *Donner* 3184, 23.ix.1969, Cariewerloo Homestead (MEL); Central Salt Lakes and Plateaux (Acraman): *Hilton* s.n., 13.vii.1954, top of Uro Bluff (AD); Great Victoria Desert (Yellabina): *Mowling* 36, 27.ix.1976, 15 km W of Barton (AD). Northern Arid: Western Sandplains (Mt Sir Thomas): *Helms* s.n., 23.vi.1891, 96 km E of Mt Lindsay (AD).

WESTERN AUSTRALIA: Eremaean (Helms): *George* 3754, 19.viii.1962, 12 miles E of Cosmo Newberry (PERTH); (Eucla): *Aplin* 1690, 1.ix.1962, 6 miles N of Eucla (PERTH); (Austin): *Smith* 66/513, 15.ix.1966, 7 miles S of Broad Arrow on Menzies-Kalgoorlie Road (MEL). - South-West(Roe): *Foreman* 789, 19.ix.1984, 4 km E of Lake King (MEL); (Avon): *Smith* 261, 10.ix.1983, Amery (MEL); (?Darling): *Cronin* s.n., anno 1889, sources of Blackwood River (MEL 614625).

Distribution. Queensland, New South Wales, Victoria, Tasmania, South Australia, Western Australia.

Ecology. It usually occurs in *Eucalyptus* mallee or open *Eucalyptus* woodland communities, associated with *Eucalyptus erythronema, E. clelandii, E. griffithsii, E. oleosa, E. transcontinentalis, Melaleuca uncinata, Acacia* spp., *Eremophila* spp., *Triodia* spp., *Beyeria leschenaultii, Dodonaea bursariifolia* and *Hakea multilineata.* The soils are usually sandy, shallow or deep, frequently overlying limestone or sandstone, often in association with lateritic gravel, rarely clayey.

Notes. W. rigida is an extremely variable species which is often difficult to distinguish from *W. dampierii* and *W. eremicola.* The distinguishing characters are summarized in the 'Key to species'

White & Francis (1922) believed that the Queensland material referred to *W. rigida* by Bailey (1901) actually belonged to *W. cheelii.* A detailed reappraisal of these two taxa is required. A recent collection (*Barker* 4856) from the Warrego district of Queensland appears to be a typical specimen of *W. rigida.*

The calyx of *S.A. Pastoral Board* s.n. (AD 97628557) is very similar to *W. eremicola.* It has calyx lobes of about 2.8 mm long and a calyx lobe to calyx tube ratio of about 0.8. However, the vegetative characters are typical of *W. rigida.*

Conservation status. Although this species is often locally rare, it is not considered to be at risk.

Vernacular names. Stiff Westringia (Willis 1973, Cunningham et al. 1982); Stiff Western Rosemary (Cunningham et al. 1982).

3. **Westringia eremicola** A. Cunn. ex Benth., Labiat. Gen Spec. 459 (1834); J.D. Hook., Bot. Mag. t. 3438 (1835); Benth. in DC., Prodr. 12: 571 (1848); Fl. Austral. 5: 130 (1870); F. Muell., Fragm. 9: 163 (1875) [as '*W. longifolia*' p.p.]; Ewart, Fl. Victoria 980 (1931 [as 1930]); Boivin, Proc. Roy. Soc. Queensland 60: 107 (1949 [as 1950]); Robertson in J.M. Black, Fl. S. Austral. 2nd. edn, 4: 742, fig. 1063A & B (1957); Beadle, Evans & Carolin, Fl. Sydney Region 519 (1963); Burbidge & M. Gray, Fl. Austral. Cap. Terr. 316, fig. 318 (1970); Willis, Handb. Pl. Victoria 2: 585 (1973 [as 1972]); G. Cunningham et al., Pl. W. New S. Wales 581 (1982 [as 1981]). *Lectotype* (here chosen): *A. Cunningham* s.n., anno 1817, 'Arid wastes on the Lachlan R. [River]' New South Wales (lecto: K - left specimen).

[*W. angustifolia* auct. non R. Br. (1810): J.M. Black, Fl. S. Austral. 494 (1926).]

[*W. dampierii* auct. non R. Br. (1810): G. & P. Althofer, Austral. Pl. 10: 361 (1980).]

[*W. grevillina* auct. non F. Muell. (1855): H. Eichler, Suppl. J.M. Black's Fl. S. Austral. 270 (1965); Costermans, Native Trees & Shrubs SE Austral. 268 (1981) (p.p.)].

W. eremicola var. *quaterna* Benth., Fl. Austral. 5: 130 (1870); Boivin, Proc. Roy. Soc. Queensland 60: 108 (1949 [as 1950]). *Lectotype* (here chosen): *C. Moore* 38, -.iii.1865, Shoalhaven Gullies near Glenroch, New South Wales (lecto: MEL 614401 - right specimen; isolecto: MEL 614401 - left & central specimens).

Small shrubs, (0.3-)0.5-1.5(-2) m high. *Branches* triangular or quadrangular to subterete, moderately to densely hairy (70-125 hairs/mm^2); hairs ± appressed, simple, antrorse, 0.2-0.3(-0.4) mm long. *Leaves* in whorls of 3(or 4), spreading and usually slightly recurved; *petioles* 0.5-0.7 mm long, densely hairy; *lamina* narrowly elliptic to linear, (4-)8-20(-27) mm long, (0.5-)0.8-1.3(-1.6) mm wide (length to width ratio (4-)6-20 (-36), length of maximum width from base to total lamina length ratio up to c. 0.6), moderately to densely hairy, often only with hair bases persistent on mature leaves (hence, appearing glabrous), abaxial surface densely hairy along midrib, base obtuse or lamina not restricted at base, margin entire and recurved, often such that abaxial surface almost concealed, apex submucronate with mucro up to c. 0.3 mm long; venation not visible, midrib slightly raised on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic. *Pedicel* 0.6-1.2(1.7) mm long (up to 2 mm long in fruit), densely hairy; *prophylls* inserted near base of calyx, narrowly ovate to linear, 1-2.6 mm long, 0.2-0.5 mm wide (length to width ratio 3.3-13), moderately to densely hairy, base narrowly cuneate or prophylls not restricted at base, margin often slightly incurved, apex obtuse to subacute. *Calyx* green, mid-vein and marginal veins of sepals slightly thickened to form ridges on calyx tube, outer surface densely hairy, hairs appressed, antrorse, 0.3-0.4 mm long; tube 2.5-4(-4.5) mm long, inner surface glabrous at base, moderately to densely glandular (glands pedicellate) on part surrounding ovary, glabrous in mouth, or glabrous throughout; lobes triangular (usually appearing narrowly triangular because margin strongly recurved), (1-)1.3-3(-5.3) mm long, 1-2 mm wide (length to width ratio 1.2-2.6), inner surface densely hairy, apex subacute; (calyx lobe to tube ratio (0.3-)0.4-1.3(-1.7)). *Corolla* 6.5-8.5 mm long, lilac, mauve or purple, rarely white, with orange to brown dots medially on abaxial surface of tube and mouth, dots also on lateral and abaxial lobes, or dots apparently absent; outer surface glabrous basally, sparsely to moderately hairy on distal part of tube, densely hairy on lobes, hairs erect to subappressed and antrorse, 0.1-0.4 mm long; inner surface densely hairy in throat, sparsely hairy on basal part of lobes, lobes often glabrous distally, hairs ± erect and spreading, (0.2-)0.3-0.4 mm long; *tube* 5-6.5 mm long, tubular, dilated basally around ovary, constricted immediately above ovary, dilated in throat such that tube appears funnelform distally, diameter at mouth c. 2 mm; *abaxial median lobe* ± oblong to obovate, 2.9-3.9 mm long, 2.9-3.3 mm wide (length to width ratio 1-1.2), apex rounded, irregular and bilobed (sinus 0.5-0.7 mm long); *lateral lobes* oblong to slightly obovate, 2.9-3.3 mm long, 1.6-2 mm wide (length to width ratio 1.6-2.1), apex rounded and ± irregular; *adaxial median lobe-pair* 2.6-3.8 mm long, 2.6-3.9 mm wide (length to width ratio 0.9-1.2), bilobed (sinus 1.3-1.5 mm long), each half of lobe-pair broadly ovate (length to width ratio c. 1.2) and each with a rounded apex. *Androecium* inserted in corolla mouth. *Staminal filaments* 1.3-2 mm long, glabrous; *anthers* 0.7-1.3 mm long, lobe without basal acumen. *Staminodal filaments* 0.5-1.3 mm long, sparsely hairy (particularly at base); *staminodal lobes* white, 0.6-0.8 mm long. *Disc* cylindrical, c. 0.5 mm high. *Pistil* 7-8 mm long; ovary 0.7-1 mm long; style 6.5-7 mm long; stigma lobes c. 0.4 mm long. *Mericarps* 1.3-1.5 mm long, distally 0.7-0.8 mm extended beyond base of style; *seeds* ± flattened, narrowly obovate in outline, c. 1.5-1.8 mm long.

Selected specimens examined (118 examined). NEW SOUTH WALES: North Western Slopes: *McKee* 273, 30.ix.1952, below Bluff Pyramid, Warrumbungle Mts (MEL); Central Western Slopes: *Baker* s.n., 17.x.1917, Kamarah (MEL 575448); Southern Tableland: *Moore* 3047, 3.xii.1954, 5 miles from Cotter on Tidbinbilla Road [Australian Capital Territory](AD); North Western Plains: *Streimann* 756, 12.xii.1973, Pilliga Scrub, 55 km SW of Narrabri (AD); South Western Plains: *Carrick* 3193, 19.x.1972, 10 km S of Marong(AD, MEL).

VICTORIA: Eastern Highlands: Victorian Alps: *Walter* s.n., -.xi.1891, Pine Mountain (MEL 1515914); East Gippsland: *Willis* s.n., 12.xi.1968, Little River Gorge (MEL 614355); East Gippsland Plains: *Beauglehole* (& *Finck)* 32354, 13.xii.1969, between The Narrows and Totem Point, Mallacoota Inlet National Park (MEL). - Northern Plains: *Phillips* CBG 24052, 8.xi.1965, Whipstick Scrub, N of Bendigo (AD). - Mallee: Big Desert: *Beauglehole* (& *Finck*) 29023, 7.x.1968, Rudd's Rocks, W side of Wyperfeld National Park (AD, MEL); Wimmera: *Beauglehole* 19005, 3.ix.1962, 8 miles N of Mt Arapiles (MEL); Little Desert: *Beauglehole* 42930, -.x.1948, Woraigworm (MEL).

SOUTH AUSTRALIA: Murray Mallee: Murray Lakes (Lake Alexandrina): *Hergstrom* s.n., -.ix.1961, Cooke Plains (AD); Northern Calcarenite Ridges and Plains (Cantana): *Wilson* 1472, 3.viii.1960, c. 8 km from Coonalpyn (AD); (Coonalpyn): *Symon* 12776, 9.ix.1980, between Kiki & Coonalpyn (AD). South-East Mallee Heathlands (Bordertown): *Herb. Ising* s.n., 16.x.1925, Bordertown (AD); (Cannawigara): *Boomsma* 281, 26.ix.1977, 20 km NE of Bordertown (AD); (The Big Desert): *Symon* 8622, 21.x.1973, Scorpion Springs Conservation Park (AD); (Karoonda): *Phillips* CBG 23844, 20.ix.1965, 7 miles S of Lock (AD); (Moorlands): *Donner* 6757, 20.x.1978, turnoff to Cooke Plains (AD). Mt Lofty Block: Kangaroo Island (Amberley): *Cooper in herb. Southcott* B176, 8-14.viii.1961, near Muston (AD); (MacGillivray): *Tepper* 1251, 13.iii.1884, near Lashmar's Lagoon (MEL 614650); Peninsula Uplands (Sandergrove): *Smith* 371, 22.ix.1967, c. 3 km S of Monarto South (AD); (Claredon): *Gill* 251, s. dat., Milang scrub (MEL); (Mt Terrible): *Clipstone* 25, 6.xi.1980, near Athelstone (AD); (Hahndorf): *?Fischer* s.n., s. dat., near Mt Barker (MEL 614651). Eyre and Yorke Peninsulas: Southern Highlands and Plains (Lincoln): *Alcock* 763, 3.x.1965, Cape Donnington (AD); West Coast (Kappawanta): *Jackson* 1131, 4.x.1967, c. 9 km S of Bascombe Well Homestead (AD); (Polda): *Ising* s.n., 16.ix.1938, Venus Bay (AD); Central Mallee Plains and Dunes (Hincks): *Wheeler* 1040, 11.x.1968, Hincks National Park (AD); (Lock): *Phillips* CBG 23844, 20.ix.1965, 7 miles S of Lock (AD); (Hambidge): *Alcock* 1027, 28.viii.1966, SW corner of Hambidge Flora and Fauna Reserve (AD); Southern Yorke Peninsula (Innes): *Copley* 4504, 30.viii.1974, Warrenben National Park (AD).

Distribution. ?Queensland, New South Wales (incl. Australian Capital Territory), Victoria and South Australia.

Ecology. This species usually occurs in sandy soils (rarely in clays), overlying or derived from sandstones, shales or granitic rocks. Often associated with buckshot gravel. In the drier areas it is usually associated with mallee-eucalypt communities with an understorey typically of *Leptospermum laevigatum* (*L. coriaceum*), *Acacia brachybotrya*, *Calytrix tetragona*, *Daviesia spp.*, *Leucopogon* spp. and *Triodia* sp. In central Victoria it is associated with Box-Ironbark *Eucalyptus* forests, whereas in eastern Victoria it is associated with coastal to foothills riparian cliff communities of *E. botryoides*, *Banksia integrifolia*, and *Acacia kybeanensis*, *Eucalyptus glaucescens*, *Leptospermum scoparium* (respectively), plus *Oxylobium arborescens*, *Pomaderris andromedifolia* and *P.aurea*. In the Australian Capital Territory it has been recorded as occurring in *Eucalyptus cordieri-E. dives-E. viminalis* dominated forests.

Notes. Black (1926) included *W. angustifolia* R. Br. in the flora of South Australia. Boivin (1949) correctly restricted this taxon to Tasmania, but he appears not to have included '*W. angustifolia*' sensu Black in his treatment of the genus. Robertson (in Black 1957) realized that the taxon referred to *W. angustifolia* (by Black 1926) was *W. eremicola*. Eichler (1965) assumed that Boivin regarded '*W. angustifolia*' sensu Black as synonymous with *W. grevillina*. It appears likely that Boivin did not examine South Australian material of *W. eremicola*.

I have applied a relatively broad species concept to this species. The typical form of this species occurs in central New South Wales and central Victoria. This species is often extremely difficult to distinguish from other closely related taxa. Although populations from the drier parts of New South Wales and Victoria are usually readily identifiable, the South Australian populations are very similar to some populations of *W. rigida*.

For example, there is a reduction in the calyx lobe to tube ratio, such that the eastern populations (of New South Wales and Victoria) have larger values than the South Australian population. Therefore, in the South Australian populations, this feature is not as clearly diagnostic as it is for the Victorian and New South Wales populations of *W. eremicola*.

The most useful characters for distinguishing this species from *W. rigida* are summarized in the 'Key to species'. Unfortunately, the character-states are not mutually exclusive.

The eastern Victorian populations have much longer leaves than the other Victorian populations. The former populations show strong similarities with *W. longifolia* (? Queensland, New South Wales). The two are maintained as distinct. In *W. longifolia* the outer surface of the calyx is usually (if not always) glabrous and the leaves are 1.5-2.5 mm wide, with the abaxial surface largely exposed. In *W. eremicola* the outer surface of the calyx is moderately to densely hairy and the leaves are 1-1.5 mm wide, with the abaxial surface largely concealed. Furthermore, *W. longifolia* usually has white corollas, whereas *W. eremicola* usually has purple to lilac corollas. Much of the material from the wetter regions of Queensland, which is referred to *W. eremicola* is possibly *W. longifolia*.

W. cremnophila is very closely related to the eastern Victorian populations of *W. eremicola*. The most obvious difference between the two taxa is that the former is more densely hairy on the distal (hence, young) parts of the branches, and also on the outer surface of the calyx, than the latter taxon. The taxonomic significance of these characters requires detailed investigation.

Conservation status. Considered not at risk.

Vernacular names. Slender Westringia (Willis 1973, Cunningham et al. 1982); Slender Western Rosemary (Cunningham et al. 1982).

Notes on *Westringia longifolia* R. Br.

Stearn (1960) suggested that the lectotype of a Brownian species should be chosen from the most complete individual specimen in the British Museum which has been annotated by Brown. Therefore, I have delayed the choosing of a lectotype until I have examined Brown's material in the British Museum.

Boivin (1949) incorrectly referred *R. Brown* s.n. (MEL 614361), which is part of the type material of this species, to *W. eremicola*

See 'Notes' under *W. eremicola* for additional discussion of this species.

Bentham (1870) incorrectly cited *Sieber* 188 [previously cited by Bentham (in Candolle 1848)] as *Sieber* 180. This is presumed to be a typographical error (refer MEL 614456 and Dietrich 1881, p. 300). This is not type material because Sieber collected in Australia from June until December 1823 (Dietrich 1881), whereas the protologue of *W. longifolia* was published in 1810.

For completeness, a full literature citation and distribution summary are provided below.

Westringia longifolia R. Br., Prodr. 501 (1810); Benth., Labiat. Gen. Spec. 460 (1834); in DC., Prodr. 571 (1848); Fl. Austral. 5: 131 (1870); F. Muell., Fragm. 9: 163 (1875); C. Moore & E. Betche, Handb. Fl. New S. Wales 353 (1893); Boivin, Proc. Roy. Soc. Queensland 60: 109 (1949 [as 1950]); G. & P. Althofer, Austral. Pl. 10: 362 (1980). *Type*: *R. Brown* s.n., s. dat. [probably August - December 1803], Grose [River], New South Wales (BM n.v., MEL 614361).

Prostanthera linearis Sieber ex Benth. Labiat. Gen. Spec. 455 (1834)[non R. Br. Prodr. 501 (1810)]. Type: *Sieber* 189 (Dietrich 1881), n.v.

[*W. eremicola* auct. non A. Cunn. ex Benth.: F.M. Bailey, Queensl. Fl. 5: 1206 (1902) p.p.].

Distribution. ?Queensland and New South Wales.

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A Taxonomic Revision of *Prostanthera* Labill. Section *Prostanthera* (Labiatae). 1. The Species of the Northern Territory, South Australia and Western Australia

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Abstract

Conn, Barry J. A Taxonomic Revision of *Prostanthera* Labill. Section *Prostanthera* (Labiatae) 1. The Species of the Northern Territory, South Australia and Western Australia. Nuytsia 6(3): 351-411 (1988). A taxonomic revision of the 21 species of *Prostanthera* section *Prostanthera* which occur in the Northern Territory, South Australia and Western Australia is presented. Two of these species also occur in the eastern states of Australia. Eight new species are described, namely, *P. albiflora*, *P. althoferi*, *P. ammophila*, *P. centralis*, *P. nanophylla*, *P. petrophila*, *P. splendens* and *P. verticillaris*. Two subspecies of *P. althoferi* (namely, ssp. *althoferi* and ssp. *longfolia*) are recognized. *P. baxteri* var. *sericea* is raised to specific rank (namely, *P. sericea*). Keys to the species and subspecies are provided. All recognized taxa are provided with full descriptions, distribution information (including maps), ecological and other relevant notes.

Introduction

This is the second paper presenting the taxonomic conclusions of my investigations into the genus *Prostanthera*. The first paper (Conn 1984) presented a taxonomic account of *Prostanthera* section *Klanderia*. The taxonomic revision of *Prostanthera* section *Prostanthera* will be presented in two parts. This paper presents an account of the species which occur in the Northern Territory, South Australia and Western Australia. The second paper will deal with the species of eastern Australia (Queensland, New South Wales, Victoria and Tasmania). Although this represents an artificial division of the Section, only two species (namely, *P. spinosa* and *P. striatiflora*) occur in both geographical areas. A detailed discussion of the morphological features which characterize section *Prostanthera* will be presented in the account which deals with the species of this Section which occur in eastern Australia. Some information in Conn (1984) may clarify problems with respect to interpretation of morphology, even though that paper is primarily concerned with section *Klanderia*.

Detailed population studies are necessary in several of the species presented in this paper, so that the degree of variability within these species can be ascertained. This is particularly true for those species which are only known from one or a few collections. Furthermore, such field studies would assist in the elucidation of the relationship between species.

Methods and Presentation

In general, usage of terms follows Lawrence (1955), Porter et al. (1973), and Stearn (1973). Terminology for plane shapes follows Ball et al. (1962). Author and literature abbreviations follow Stafleu & Cowan (1976, 1979, 1981, 1983, 1985).

In the descriptions, those character states which occur in one or a few specimens (hence, likely to occur in fewer than 10% of the individuals in the relevant taxon) are enclosed by parentheses. Parentheses are also used to enclose rarely occurring character states which may be present in an otherwise typical individual specimen. No distinction is made between these two situations.

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The distribution of each taxon is briefly summarized after its description. The distribution summary and the citation of selected specimens examined are grouped according to various regional subdivisions. The subdivisions used for the States are: for New South Wales those of Jacobs & Pickard (1981)(which is modified from Anderson 1961), for Victoria those of Cochrane et al. (1968), for the Northern Territory those of Anonymous (1981), for South Australia those of Laut et al. (1977a, 1977b, 1977c, 1977d, 1977e, 1977f, 1977g), and for Western Australia those of Beard (1980). The conservation status of each taxon is provided (as stated by Conn, in Leigh et al. 1981) or using the formulae of Leigh et al. (1981).

The ecological notes are mostly taken from collector's notes on the labels of herbarium sheets. Common names are included where known.

Herbarium abbreviations are those given in Holmgren et al. (1981). Kings Park and Botanic Gardens (West Perth, Western Australia) is referred to as 'KP'. Collections from the following herbaria were examined: A, AD, ADW, B, BR, BRI, C, CANB, CBG, E, F, GH, GOET, HAL, HBG, HO, K, KP, L, LD, LE, LY, M, MEL, MO, NE, NSW, NT, NY, P, PERTH, S, SYD, UC, UPS, US, W, WRSL, WU.

Key to Species

1a. Leaves whorled (Western Australia) ..... 1. *P. verticillaris*

1b. Leaves decussate

2a. Branches with spines present

3a. Calyx lobes very unequal; shrub glabrous except for a few hairs at distal nodes; branches ± patent and distant (South Australia) 2. *P. nudula*

3b. Calyx lobes ± equal in length; shrub usually hairy; branches ± erect and relatively crowded (New South Wales, Victoria, South Australia) ..... 3. *P. spinosa*

2b. Branches not spiny

4a. Leaf lamina with margin slightly undulate and ± crenate; plant viscid (Western Australia) ..... 4. *P. eckersleyana*

4b. Leaf lamina with margin ± flat and entire, sometimes with an occasional tooth present

5a. Leaf lamina strongly incurved or terete

6a. Leaves terete (Northern Territory, South Australia, Western Australia) ..... 5. *P. sericea*

6b. Leaves narrowly obovate, narrowly elliptic, narrowly ovate to linear

7a. Leaf lamina length to width ratio 13.9-39; prophylls moderately to densely hairy; anthers not cristate; fruiting calyx enlarged; corolla with weak, loosely tangled hairs on inner surface (Western Australia) ..... 6. *P. campbellii*

7b. Leaf lamina length to width ratio 2.5-13(-15); prophylls glabrous or with an occasional hair present; anthers cristate dorsally; fruiting calyx not or only slightly enlarged; corolla with erect to appressed, ± straight hairs, not loosely tangled

8a. Calyx with outer surface glabrous or with a few scattered hairs at base; prophylls 0.3-0.8(-1.2) mm long, 0.1-0.3(-0.4) mm wide, soon deciduous and/or undeveloped; corolla 6.5-10 mm long, lacking markings (Western Australia) ..... 7. *P. canaliculata*

8b. Calyx with outer surface densely hairy on adaxial surface, abaxial surface glabrous or with an occasional hair; prophylls 1-3.9 mm long, 0.2-0.7 mm wide, usually persistent; corolla 10.5-13 mm long, with mid-brown to dull orange spots in throat and on base of abaxial median lobe (Western Australia) .....8. *P. baxteri*

5b. Leaf lamina with most of its surface ± flat; margin often slightly incurved or recurved

9a. Leaves moderately to densely hairy (*P. behriana* sometimes with hairs restricted to base of leaves and midrib of adaxial surface)

10a. Hairs of branches and leaves ± appressed and antrorse (note: indumentum of *P. wilkieana* sometimes superficially appearing to be totally ± appressed, but subappressed to patent hairs always present - refer lead 10b)

11a. Corolla 15-20 mm long; fruiting calyx not or only slightly enlarged, not becoming membranous as seeds mature; hairs of branches 0.3-0.4 mm long; leaves obovate to narrowly ovate (South Australia) .....10. *P. behriana*

11b. Corolla 6.5-15 mm long; fruiting calyx enlarged, becoming membranous as seeds mature; hairs of branches 0.5-0.7 mm long (*P. althoferi* has hairs 0.2-0.5 mm long; leaves narrowly obovate to linear)

12a. Prophylls 0.7-3.6 mm long, 0.1-0.4 mm wide; lamina narrowly obovate to linear; style 5-7 mm long; corolla white with mauve to purple striations on inner surface of tube and/or mouth and base of lobes (South Australia, Northern Territory, Western Australia) 9. *P. althoferi*

12b. Prophylls 3.8-8.1 mm long, 0.4-1.1 mm wide; lamina ovate to narrowly elliptic; style 7.2-7.6 mm long; corolla white basally, purple to mauve distally with yellow spots in throat and on base of abaxial median lobe (South Australia) .....11. *P. ammophila*

10b. Hairs of branches and leaves ± patent or indumentum a mixture of appressed and patent hairs, then hairs retrorse to antrorse

13a. Indumentum consistently composed of patent hairs (Northern Territory, Western Australia).....12. *P. centralis*

13b. Indumentum a mixture of appressed, subappressed and patent hairs, hairs retrorse to antrorse

14a. Hairs of leaves ± straight; shrub 0.3-1.2 m high; glands absent on outer surface of calyx lobes; hairs 0.2-2.1 mm long (Northern Territory, South Australia, Western Australia) .....13. *P. wilkieana*

14b. Hairs of leaves curled; shrub up to 0.3 m high; hairs 0.3-0.6 mm long; sparsely to moderately glandular on outer surface of calyx lobes (Western Australia) 14. *P. scutata*

9b. Leaves glabrous or with an occasional hair to very sparsely hairy (indumentum usually not obvious without magnification)

15a. Leaf lamina transversely elliptic or transversely ovate to transversely broad-elliptic or transversly broad-ovate, lamina length to width ratio 0.5-0.8 [3.5-6 mm long, 6-8 mm wide] (Western Australia) .....15. *P. splendens*

15b. Leaf lamina narrowly ovate to narrowly obovate, ovate to obovate, never transverse, lamina length to width ratio at least 1

16a. Calyx with adaxial lobe up to 4 mm long

17a. Leaves arranged along long axes and not clustered; lamina 8.5-26(-32) mm long

18a. Corolla 5-6 mm long; calyx with outer surface glabrous, except for an occasional hair at base; prophylls 0.5-0.8 mm long, 0.1-0.2 mm wide (Western Australia) .....16. *P. petrophila*

18b. Corolla 15-20 mm long; calyx sparsely to densely hairy on outer surface, at least on adaxial lobe; prophylls 1-6 mm long, 0.2-1 mm wide

19a. Corolla 15-20 mm long; leaf lamina (9.4-)14-26(-32) mm long; calyx adaxial lobe length to calyx abaxial lobe length ratio 1.5-2.1 .....10. *P. behriana*

19b. Corolla 10.5-13 mm long; leaf lamina 4.8-15 mm long; calyx adaxial lobe length to calyx abaxial lobe length ratio 0.3-0.8 .....8. *P. baxteri*

17b. Leaves clustered on short axes; lamina 1.3-4.6 mm long

20a. Calyx tube length to calyx abaxial lobe length ratio 1-1.5 [calyx tube 2.5-3 mm long, abaxial calyx lobe 1.7-3.1 mm long, adaxial calyx lobe 1.5-2.2 mm long]; corolla tube 6-7 mm long, abaxial median lobe 2.6-4.8 mm long, adaxial median lobe-pair 3-6 mm long (South Australia) .....17. *P. eurybioides*

20b. Calyx tube length to abaxial calyx lobe length ratio 0.4-0.5 [calyx tube 1.3-2.3 mm long, abaxial calyx lobe 3.2-4.6 mm long, adaxial calyx lobe 2.9-3.9]; corolla tube 7.4-10.1 mm long, abaxial median lobe 5.9-7.1 mm long, adaxial median lobe-pair 2.6-3.1 mm long (Western Australia) .....18. *P. nanophylla*

16b. Calyx with adaxial lobe 4.6-26 mm long

21a. Corolla tube 10.3-11.4 mm long; corolla white with purple striations and orange to yellow spots (yellow-orange lines often present also) on inner abaxial surface of tube; anthers inserted 3.3-3.7 mm above base of corolla (New South Wales, Northern Territory, South Australia, Western Australia) .....19. *P. striatiflora*

21b. Corolla tube 15-22 mm long; corolla pale mauve, pale blue to pink or white, with blue or dark ?purple spots on inner abaxial surface of tube, striations absent; anthers inserted 7.2-9.1 mm above base of corolla

22a. Calyx light green with outer surface hairy; adaxial calyx lobe 4.6-13 mm long; corolla white with pale blue spots in throat; anthers not cristate; prophylls 2.2-3.4 mm long (Western Australia) .....20. *P. albiflora*

22b. Calyx dark mauve to purple with outer surface glabrous; adaxial calyx lobe 15-26 mm long; corolla pale mauve, pale blue to pink with dark ?purple spots on inner surface of tube and on base of abaxial median lobe; anthers usually cristate; prophylls (4.5-)6-13 mm long (Western Australia) .....21. *P. magnifica*

1. **Prostanthera verticillaris** Conn, sp. nov. (Figure 3a)

Species nova Sectionis *Prostantherae*. *Frutices* circa 1.2 m. alti. *Rami* et ramuli plus minusve teretes, pilis moderatis usque densis vestita, argentei, pilis 0.5-0.9 mm longis, glandibus absentibus. *Folia* verticillata, basem versus pilis sparsissmis vestita; *petiolus* absens vel minus quam 1 mm longus; *lamina* ovata usque elliptica, 9.5-11 mm longa, 4-6 mm lata, basi acuta usque brevissima attenuata, margine integro, leviter recurvato, apice obtuso. *Pedicellus florum* circa 2 mm longus, pilis densis vestita, pilis 0.5-0.9 mm longis; *prophyllis* in dimidio distali pedicello affixis, anguste ovatis, 4.1-4.8 mm longis, 0.8-1 mm latis. Calyx probabiliter viridis; *tubus* circa 3.5 mm longus, extra pilis sparsis vestita, glandibus absentibus, interius glaber vel pilis sparsissmis vestita; *lobus abaxialis* ovatus, circa 2 mm longus, 2.5-2.7 mm latus, apice acuto, extra glaber vel pilis sparsissimis vestita, glandibus absentibus, interius pilis sparsis vestita; *lobus adaxialis* late ovatus, 4-4.5 mm longus, 3-4 mm latus, apice subacuto, extra glaber vel pilis sparsissimis vestita, glandibus absentibus, interius pilis sparsissimis vestita, glandibus absentibus. *Corolla* 9-12 mm longa, probabiliter alba, extra distaliter pilis moderatis usque densis vestita, glandibus absentibus, interius distaliter pilis sparsis usque moderatis vestita, glandibus absentibus; *lobus abaxiali-medianus* spathulatus, 5.3-6.8 mm longus, 3.6-5.5 mm latus, apice irregulari et rotundato, lobis lateralibus late ellipticis, 2.3-2.8 mm longis, circa 2.4 mm latis, apice leviter irregulari et rotundato, pari loborum adaxiali-mediano late ovato, circa 4 mm longo, circa 4 mm lato, apice leviter irregulari et rotundato, bilobata, sinu circa 1.2 mm longo. *Stamina* 3.5-4.4 mm e basi corollae affixa; filamenta 2.9-3.4 mm longa; antherae 1-1.2 mm longae, appendice 1.1-1.2 mm longa. *Pistillum* 8.3-8.5 mm longum; ovarium circa 1.3 mm longum, glabrum, glandibus absentibus; stylus circa 6.5 mm longus; lobis stigmatis 0.2-0.4 mm longis. *Fructus* non visi.

Typus: *Newbey* 2710, 30.ix.1967, Warriup Hill, NE of Albany, Western Australia (holo: PERTH; iso: MEL 1547344).

Shrub c. 1.2 m high. *Branches* ± terete, moderately to densely hairy [80-85 hairs/mm^2], silvery distally; hairs appressed to subpatent, antrorse, 0.5-0.9 mm long, white, glands absent. *Leaves* whorled, arranged in 3's or 4's, ?light to mid green; very sparsely hairy basally (including basal half of margin) [5-8 hairs/mm^2], distally with an occasional hair or glabrous; hairs ± straight, subpatent, antrorse, 0.5-0.9 mm long; densely glandular [more than 200 glands/mm^2]; *petiole* absent or less than 1 mm long; *lamina* ovate to elliptic, 9.5-11 × 4-6 mm [length to width ratio 1.8-2.4, length of maximum width from base to total lamina length ratio 0.4-0.6]; base acute to very shortly attenuate; margin entire, slightly recurved; apex obtuse; venation not visible, midrib faint, often indistinct distally. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; c. 6-8-flowered [per conflorescence]. *Pedicel* c. 2 mm long, densely hairy [80-86 hairs/mm^2], glands absent; prophylls inserted on distal half of pedicel [a_1 axis to anthopodium ratio c. 1.5-1.7], opposite, narrowly ovate, 4.1-4.8 mm long, 0.8-1 mm wide [length to width ratio 4.8-5.6, length of maximum width from base to total lamina length ratio 0.3-0.4], sparsely hairy [c. 10 hairs/mm^2], base shortly attenuate, margin entire, apex acute. *Calyx* ?green; tube c. 3.5 mm long, outer surface sparsely

hairy [6-10 hairs/mm^2], glands absent, inner surface glabrous or with an occasional hair at mouth, glands absent; *abaxial lobe* ovate, c. 2 mm long, 2.5-2.7 mm wide [length to width ratio 1.3-1.4], apex acute, outer surface glabrous or with an occasional hair, glands absent, inner surface sparsely hairy at base and along margin, glands absent; *adaxial lobe* broadly ovate, 4-4.5 mm long, 3-4 mm wide [length to width ratio 1-1.3], apex subacute, outer surface glabrous or with an occasional hair, glands absent, inner surface with an occasional hair, glands absent; [adaxial lobe length to abaxial lobe length ratio 2-2.3]. *Corolla* 9-12 mm long, probably white; outer surface glabrous on tube to base of lobes, moderately to densely hairy on lobes [30-117 hairs/mm^2], glands absent; inner surface glabrous in tube, mouth sometimes sparsely hairy, lobes moderately hairy [(30-32 hairs/mm^2], glands absent; *abaxial median lobe* spathulate, 5.3-6.8 mm long, 3.6-5.5 mm wide [length to width ratio c. 1-1.2], apex irregular and rounded; *lateral lobes* broadly elliptic, 2.3-2.8 mm long, c. 2.4 mm wide [length to width ratio 1-1.2], apex slightly irregular and rounded; *adaxial median lobe-pair* broadly ovate, c. 4 mm long, c. 4 mm wide [length to width ratio 1], apex slightly irregular and rounded, bilobed (sinus c. 1.2 mm long). *Stamens* inserted 3.5-4.4 mm above base of corolla; filaments 2.9-3.4 mm long, glabrous; anthers 1-1.2 mm long, cristate dorsally, connective extended to form a basal appendage 1.1-1.2 mm long, terminating in 3 or 4 narrowly triangular trichomes. *Disc* c. 0.3 mm high. *Pistil* 8.3-8.5 mm long; ovary ± cylindrical, c. 1.3 mm long, diameter at base 0.8 mm, lobes 0.1-0.2 mm long, glabrous, glands absent; *style* c. 6.5 mm long; *stigma lobes* 0.2-0.4 mm long. *Fruits* not seen.

Specimen examined. Only the Type collection known.

Distribution. Endemic to the South-West Botanical Province (Eyre District) of Western Australia. Figure 11.

Ecology. Occurs 'In granitic loam' (*Newbey* 2710).

Notes. The most distinctive feature of this species is the presence of whorled leaves. Its affinities are unknown.

Conservation status. Not known. Newbey (in litt., 1984) records that 'only a few plants were seen'. Risk Code = 1K.

2. **Prostanthera nudula** J.M. Black ex E.L. Robertson, Fl. S. Australia. 2nd edn, 4: 946, 736 & 737, fig. 1054 (1957); Althofer, Cradle of Incense 146, 147 & 149 (1978); Haegi, in J. Jessop (ed.), Fl. Central Austral. 310 (1981); Conn, in J. Jessop & H. Toelken (eds), Fl. S. Austral. 3: 1214, fig. 556D (1986). *Type*: *Cleland* s.n., -[10-15].-[iv].1950, Mt Woodroffe ['Everard Park' Station (Robertson, in Black 1965)], Everard Range, South Australia (holo: AD 95701006).

Small ± erect to scrambling shrub, 0.5-2 m high. *Branches* ± terete to angled, striate, glabrous except for a few unicellular and/or multicellular hairs which are often present at the base of each ultimate branch (hairs up to c. 0.06 mm long), sparsely to rarely moderately glandular [16-33(-83) glands/mm^2], glands ± hemispherical; ultimate and penultimate branches becoming rigid and spinescent, often defoliated. *Leaves* glabrous, sparsely to moderately glandular [7-86 glands/mm^2]; *petiole* 0.3-0.8 mm long; *lamina* narrowly elliptic, 3.9-10.5 x 1.3-2.2 mm [length to width ratio 3-5.3, length of maximum width from base to total lamina length ratio c. 0.5], base obtuse to subattenuate, margin entire, slightly incurved, apex obtuse; venation not visible or indistinct, midrib slightly raised on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 2-8-flowered [per conflorescence]. *Pedicel* 1.3-2.3 mm long, slender, glabrous or with an occasional multicellular hair, moderately to densely glandular [50-200 glands/mm^2], glands hemispherical; *prophylls* inserted from approximately halfway up pedicel to near base of calyx [a, axis to anthopodium ratio 0.8-3], opposite, narrowly elliptic to narrowly obovate, 1.5-2.4 × 0.3-0.4 mm [length to width ratio 4.2-6.3, length of maximum width from base to total lamina length ratio 0.5-0.7], glabrous, moderately to densely glandular [33-100 glands/mm^2], base attenuate, margin incurved, apex obtuse. *Calyx* yellow-green (Robertson in Black 1957), glabrous except for occasional hairs on margin of lobes (hairs c. 0.05 mm long); *tube* 2.5-3.4 mm long; *abaxial lobe* very broadly

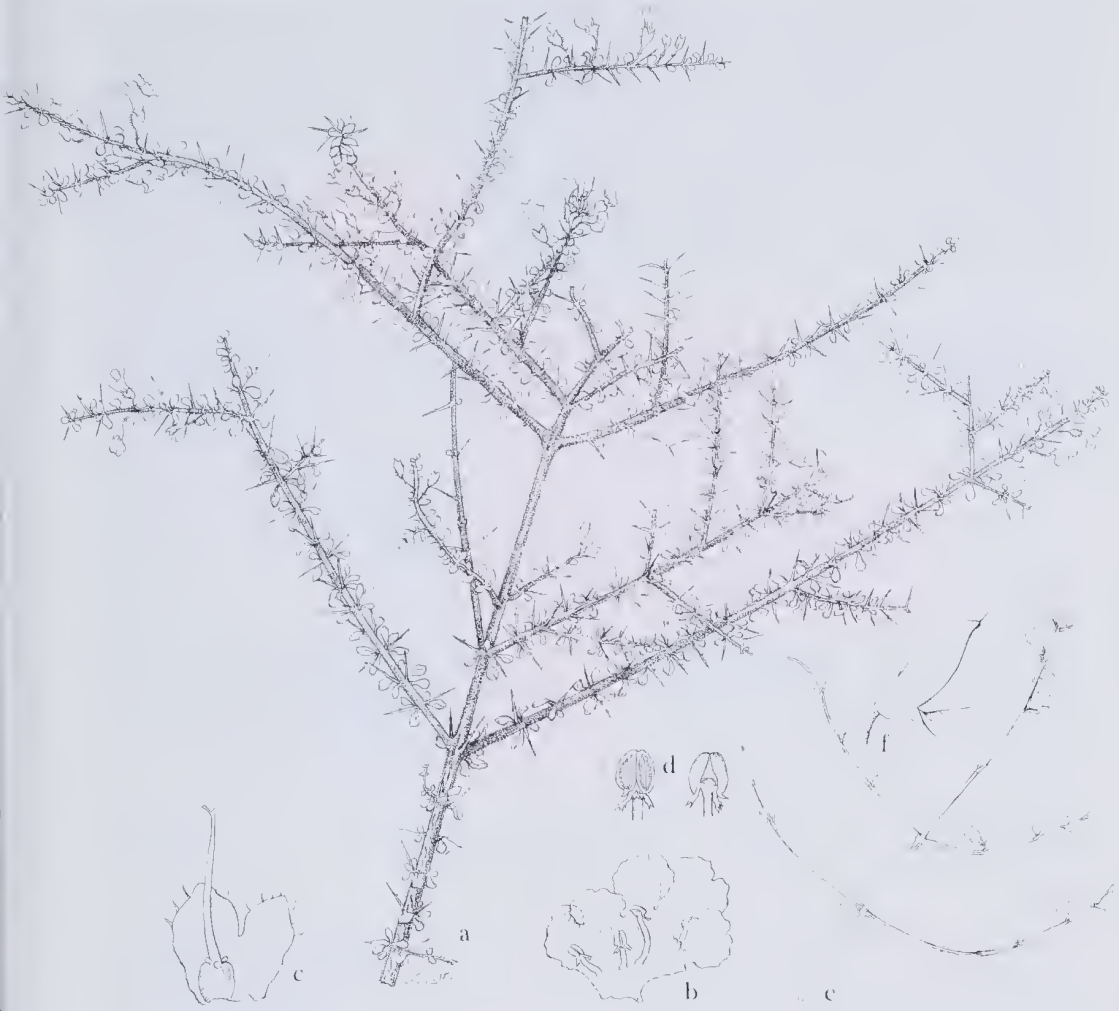

Figure 1. a-d - *Prostanthera spinosa*. a - Twig and flowers. b - Open corolla. c - Calyx and gynoecium. d - Stamens, ventral and dorsal views. (*Carrick* 3121). e-f - *P. nudula*. e - Twig and flowers. f - Calyx. (*Cleland* s.n. - AD 96603709).

ovate, 3.3-4.7 mm long, 2.6-3.6 mm wide at base [length to width ratio 0.8-1.5], margin often slightly incurved (especially in bud), apex obtuse; *adaxial lobe* broadly ovate, 5.2-8 mm long, 3.5-5.2 mm wide at base [length to width ratio 1.1-1.9], margin slightly incurved (especially in bud), apex obtuse [adaxial lobe length to abaxial lobe length ratio 1.4-1.9]. *Corolla* 8-11 mm long, pale cream-coloured, basally white, inner surface of throat and base of abaxial median lobe with yellow dots, main veins of tube purple; outer surface moderately hairy on tube [50-100 hairs/mm^2], hairs c. 0.1 mm long, sparsely glandular [16-33 glands/mm^2]; inner surface with a few scattered hairs in throat, particularly at base of lateral lobes where moderately hairy [16-50 hairs/mm^2]; *tube* 4.7-5 mm long, diameter at mouth 4-5 mm; *abaxial median lobe* very broadly ovate, 3-3.5 mm long, c. 4 mm wide at base [length to width ratio c. 0.8], margin slightly irregular and undulate, apex emarginate (sinus 0.5-0.6 mm long); *lateral lobes* oblong-triangular, c. 3 mm

long, c. 2 mm wide at base [length to width ratio c. 1.5], margin entire, apex obtuse; *adaxial median lobe-pair* very broadly ovate, 4.2-4.5 mm long, c. 4.4 mm wide [length to width ratio c. 1], margin entire, apex bilobed; each half of lobe-pair very broadly ovate, 1.5-1.6 mm long, c. 2 mm wide at base [length to width ratio c. 0.8], apex obtuse. *Stamens* inserted c. 2.5 mm from base of corolla; filaments 2.3-3.3 mm long (adaxial and abaxial filaments respectively), glabrous; anthers 1-1.3 mm long, base of lobes with irregularly thickened acumen c. 0.2 mm long, connective extended to form a basal appendage 1.5-1.6 mm long, distal end of appendage with 1-3 triangular trichomes c. 0.1 mm long, or trichomes absent. *Disc* c. 0.8 mm high. *Pistil* c. 8 mm long; *ovary* 0.5-0.6 mm long, diameter at base c. 1 mm, distal and adaxial surfaces densely glandular [c. 167 glands/mm^2], lobes c. 0.1 mm long; *style* 5.5-6 mm long, with an occasional gland basally; *stigma lobes* up to 0.3 mm long. *Fruiting calyx* slightly enlarged (abaxial lobe 4-5 mm long, 4-5 mm wide [length to width ratio 0.9-1.3]; adaxial lobe (7-)10-14 mm long, 7-10 mm wide [length to width ratio 1.1-1.6]; [adaxial lobe length to abaxial lobe length ratio 2-2.8]), becoming dry and hyaline. *Mericarps* 2-2.6 mm long, distally 1-1.3 mm extended beyond base of style, distal diameter c. 2.6 mm, distal and adaxial surfaces moderately glandular [33-67 glands/mm^2]; *seeds* c. 1.6 mm long, c. 0.8 mm wide. Figure 1e-f.

Selected specimens examined (17 examined). SOUTH AUSTRALIA: Northern Arid: Western Sandplains (Illbillee - Everard Range): *Beauglehole* 10161, 24.vi.1965, Illbillee Well area (AD); *Beauglehole* 10184, 25.vi.1968, Betty Well area (AD, MEL); *Cleland* s.n., -.-[iv].1950 (AD - type); *Cleland* s.n., 1.ix.1954 [presumably 17.viii.1954], "Everard Park" (AD, MEL); *Cornwall* 181, 3.vi.1972, near "Everard Park" Homestead (AD, MEL); *Eichler* 17464, 12.ix.1963, near Victory Well (AD); *Eichler* 17587, 17.ix.1963, Betty Well (AD); *Evans* s.n., -.i.1964, Betty Well (AD); *Helms* s.n., 1.vi.1891 (AD, MEL); *Forde* 904, -.x.1957, "Everard Park" Homestead (CANB); *Joseland* s.n., 5.x.1963, near Ungulbullarinna Rockhole (AD); *Lord* s.n., 13.iv.1950, Betty Well (MEL); *Rose* s.n. (NT 13654), 20.i.1968, near Victory Well (AD,MEL,NSW); *Symon* 3330, 17.ii.1965, near Mt Illbillee (CANB); *Whibley* 1209, 16.ix.1963, near Hartbreak [?Heartbreak] Well (AD).

Distribution. Endemic to the Everard Ranges of South Australia. Figure 12.

Ecology. Occurs amongst granite outcrops usually near watercourses. Once recorded as associated with *Acacia olgana* (*Forde* 904). Altitude 762 m (*Helms* s.n., 1.vi.1891). *Beauglehole* 10184 records that bushes partly eaten by stock.

Typification. The locality given on the holotype appears to refer to two different localities [namely Mt Woodroffe (in the Musgrave Range) and the Everard Range]. All notes and sketches accompaning the holotype are in J.M. Black's hand. In a separate folder (included with the holotype) are two fragmentary collections (in separate envelopes), one by 'E.E. Lord, April 1950' and the other by 'J.B. Cleland, Sept. [presumably August (see below)] 1954'. The information on both of these collections is in E.L. Robertson's hand (Robertson in litt. 1984). The sketches and notes referring to the second Cleland collection were done by Robertson. Material cultivated from this second collection were illustrated by C. Hill and are included in the folder. Unfortunately Cleland does not mention collecting this species of *Prostanthera* in his diaries (as held in the State Archives of South Australia). He did visit Mt Woodroffe ('Tues. April 18. 1950', Cleland's 1950 diary) and he refers to collecting at the summit. Before going to Mt Woodroffe, he visited Everard Park Station (together with E.E. Lord and others in the party). 'They arrived [at] 5 pm Mon. April 10 and remained there until Sat. April 15 [departing at 9.30 am]' (Robertson in litt. 1984). On the return trip, the party passed through the Everard Range and Everard Park on 'Sat. April 22' (Robertson in litt. 1984) with only a brief stop 'for a cup of tea' (Cleland's 1950 diary)

In 1954, Cleland stopped at Everard Park on 'Aug. 17. Lunch at Everard Park' (Cleland's 1954 diary) without mention of any collecting. On the return trip, before reaching Everard Park Homestead they 'got stuck' (Cleland's 1954 diary) in the sand of a rabbit warren to the west of the Homestead.

Robertson (in litt. 1984) believes that the correct locality of the holotype is 'Everard Park (Station), Everard Range', with Cleland collecting this species sometime between the 10th and 15th of April, 1950, before he visited Mt Woodroffe. Robertson (in litt. 1985) noted that Cleland's party had lunch 'at Betty's' [Betty Well] (Cleland's 1950 diary) on the 13th of April 1950, so it is conceivable that Cleland (hence the holotype), like *Lord* (MEL 43816), also collected there. She believes that Cleland's second collection is from the western side of the Everard Park Station and was made when the party was returning from a search of a rockhole near the Officer River in September 1954. Although it is not possible to obtain conclusive evidence, Robertson believes that the reference to Mt Woodroffe is incorrect. This error possibly occurred when J.M. Black labelled Cleland's collections from what he thought Cleland had told him. As yet, this species has not been recorded for Mt Woodroffe.

Notes. P. nudula is readily identified by the presence of rigid spinescent branches, the greatly unequal lengths of the calyx lobes [adaxial lobe length to abaxial lobe length ratio 1.4-1.9], and the cream-coloured corollas which have purple streaks on the tube. The only other species which has spines is *P. spinosa*. However, this latter species has more numerous shorter spines, calyx lobes which are less unequal in length [adaxial lobe length to abaxial lobe length ratio 0.8-1.5], and pale mauve, very pale lilac to almost white corollas which lack purple streaks.

Conservation status. Not known. Since this species has a very restricted distribution it is likely to be endangered or vulnerable (Risk Code = 2K [Conn, in] Leigh et al. 1981, pp. 49 & 86).

3. **Prostanthera spinosa** F. Muell., Defn Austral. Pl. 15 (June-July [Seberg 1986] 1855); Trans. Phil. Soc. Victoria 1:48 (Sept. 1855); J. Bot. Kew Gard. Misc. 8: 168 (1856); Pl. Victoria [vol. 2] Lithograms t. 56 (1865); Fragm. 6: 108 (1868); Benth., Fl. Austral. 5:99 (1870); F. Muell. Fragm. 9: 162 (1875); Intr. Bot. 110, fig. 51 (1877); Tate, Trans. & Proc. Roy. Soc. S. Austral. 3:78 (1880); op. cit. 6:165 (1883); Sullivan, S. Sci. Rec. 3:215 (1883); F Muell. Key Vict. Pl. 2:42 (1886); op. cit. 1:386, fig. 107 (1887); Tepper, Bot. Centralbl. 36:374 (1888); Tate, Trans. & Proc. Roy. Soc. S. Austral. 12:65 & 111 (1889); Handb. Fl. Extratrop. S. Austral. 151 & 252 (1890); C. Moore, Handb. Fl. New S. Wales 351 (1893); Briq., in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a: 220 (1895); Dixon, Pl. New S. Wales 231 (1906); Guilfoyle, Austral. Pl. 305 (1911); J.M. Black, Fl. S. Austral., 1st edn, 3: 492 (1926); Ewart, Fl. Victoria 985 (1930 [1931]); Jarman, Austral. Pl. Drawings 8: tt. 7 & 8 (1930); J.M. Black, Fl.S.Austral. 2nd edn, 4: 736, t. 1053 (1957); Galbraith, Wildfl. Victoria, 3rd edn, t. 139 (1967); Willis, Handb. Pl. Victoria, 2: 589 (1972 [1973]); Althofer, Cradle of Incense 146-149 (1978); Conn, in J. Jessop & H. Toelken (eds), Fl.S.Austral. 3: 1216 & 1217, fig. 556F (1986). *Lectotype* (here chosen): *F. Mueller* s.n., s. dat., 'Rocky declivities near springs of the Grampians', Victoria (lecto: MEL 43666; probable isolecto: *F. Mueller* s.n., s. dat., 'Grampians', Victoria - MEL 43662, MEL 43663, MEL 43664, MEL 43665).

Small ± erect shrub, sometimes scrambling and so semi-prostrate, or prostrate (*Foreman* 924), up to 0.5(-2) m high. *Branches* ± terete to quadrangular, when quadrangular often with two slightly raised lateral ridges, sparsely to densely hairy [up to c. 120 hairs/mm^2], or glabrous except for a few hairs at nodes; hairs appressed to patent, antrorse to retrorse, ± white to translucent, 0.2-0.6(-1) mm long, hairs usually long (c. 1 mm long) on young branches; sparsely glandular [up to c. 20 glands/mm^2], glands ± hemispherical; spines formed from reduced branches, 6-14 mm long, shortly tomentose basally, minutely tomentose or glabrous distally, or glabrous throughout, spines with 2-4 basal leaves. *Leaves* densely hairy or with scattered hairs, particularly on petiole, lamina margin and midrib of abaxial surface; *petiole* 0.4-1 mm long; *lamina* narrowly ovate to broadly elliptic, 1.5-6 × 1-4 mm [length to width ratio (1-)1.3-3(-4.6), length of maximum width from base to total lamina length ratio 0.3-0.5], base acute to subobtuse, margin entire and slightly recurved, apex obtuse; venation indistinct, midrib raised on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 2- c. 14-flowered [per conflorescence]. *Pedicel* 1.5-8(-15) mm long, slender,

glabrous, sometimes with a few scattered minute hairs, especially near base of calyx (hairs up to 0.2 mm long) or densely hairy (hairs up to 2 mm long) [up to c. 100 hair/mm^2]; sparsely glandular [up to c. 15 glands/mm^2], or glands absent; *prophylls* usually inserted on distal half of pedicel [a_1 axis to anthopodium ratio (0.5-)1- c. 8], when inserted at base of calyx then overlapping basal part of calyx, opposite to alternate, narrowly ovate to narrowly obovate, 0.9-2.5 mm long, 0.2-0.3 mm wide [length to width ratio 3.5-6, length of maximum width from base to total lamina length ratio 0.3-0.7], glabrous or with an occasional hair on margin and abaxial surface, or densely hairy on abaxial surface, hairs up to c. 0.5 mm long, base subattenuate, margin often slightly recurved, apex obtuse. *Calyx* green with maroon-brown tinge basally, adaxial lobe maroon-brown or green; outer surface moderately hairy [40-64 hairs/mm^2], or with scattered hairs, hairs 0.1-0.3 mm long, or sometimes glabrous except for an occasional hair on margin, sparsely to moderately glandular [10-15 glands/mm^2]; inner surface glabrous or with an occasional hair, or minutely hairy on distal 0.3-0.6 mm of lobes, hairs c. 0.1(-0.2) mm long, hemispherical glands absent, scattered pedicellate glands sometimes present; *tube* 2-3 mm long; *abaxial lobe* very broadly ovate to subcircular, 1.5-2.4(-2.8) mm long, (1-)2-3.5 mm wide [length to width ratio 0.6-1], apex broadly rounded, sometimes slightly retuse (sinus up to c. 0.2 mm long) to irregular; *adaxial lobe* depressed to very broadly angular-ovate, 1.5-3 mm long, (1-)2-4(-5) mm wide [length to width ratio 0.4-1], apex obtuse, rarely slightly retuse (sinus up to c. 0.1 mm long), [adaxial lobe length to abaxial lobe length ratio 0.8-1.5]. *Corolla* 8-14 mm long, pale mauve, very pale lilac to almost white, base of tube and abaxial surface of tube ± white, inner surface of tube usually with (2-)4-5 orange to orange-brown lines, or with 3 or 4 lines of orange to orange-brown dots medially on abaxial surface of throat, laterally with pink flecks, abaxial lobes often with very small pink flecks; outer surface glabrous basally, with a few scattered hairs distally or moderately (rarely densely) hairy distally [up to 40(-250) hairs/mm^2], hairs 0.3-0.5 mm long, or glabrous throughout; inner surface glabrous basally, sparsely to moderately hairy in mouth and basal part of lobes [17-40(-60) hairs/mm^2], hairs 0.3-1.1 mm long; *tube* 4-10 mm long, diameter at mouth 4-5 mm; *abaxial median lobe* subspathulate to very broadly angular-obovate, (1.5)3-5.5(-7) mm long, 2.6-8.5 mm wide (2-3 mm wide at base) [length to width ratio 0.5-1], apex ± irregular, emarginate (sinus up to 1.6 mm long); lateral lobes sub-circular to obovate, 2.2-5.6 mm long, c. 2-4(-5) mm wide [length to width ratio 0.9-1.9], apex obtuse, ± irregular, sometimes slightly emarginate (sinus up to c. 0.5 mm long); *adaxial median lobe-pair* depressed ovate, 1.2-4.2 mm long, 4.8-8 mm wide [length to width ratio 0.3-0.5], apex rounded, deeply bilobed (sinus up to 1.2 mm long), each half of lobe-pair ovate to depressed ovate [length to width ratio 0.7-1.4] and each with an obtuse apex. *Stamens* inserted 3-4 mm above base of corolla; filaments (1.7-)2-4 mm long, glabrous; anthers 0.8-1.6 mm long, base of lobes with minute acumen less than 0.1 mm long, connective usually cristate (triangular trichomes up to c. 0.1 mm long), sometimes ± smooth, extended to form a basal appendage 0.7-2.1 mm long, distal end of appendage with (3-)6- c. 12 triangular trichomes (trichomes 0.1-0.3 mm long). *Disc* 0.4-0.6 mm high. *Pistil* 6-8 mm long; *ovary* 0.5-1.6 mm long; *style* c. 5-6.5 mm long; *stigma lobes* 0.2-0.4 mm long. *Fruiting calyx* unchanged. *Mericarps* 2-2.5 mm long, distally c. 1 mm extended beyond base of style; seeds ± flattened to slightly concave, ± elliptic, c. 1.5 mm long, c. 0.7 mm wide. Figure 1a-d.

Selected specimens examined (160 examined). NEW SOUTH WALES: North Coast: *Clark, Pickard & Coveny* 1871, 30.vii.1969, 8 miles SSE of Coaldale (AD); *Foreman* 924, 23.viii.1985, Rocky Creek, on Coaldale road (MEL, NSW).

VICTORIA: South West: *Beauglehole* 29616, 19.xi.1968, Mt Arapiles (AD, MEL); *Willis* & *Beauglehole* s.n., 11.xii.1966, source of Glenelg River, at Strachan's Crossing, the Grampians (MEL).

SOUTH AUSTRALIA: Murray Mallee: Northern Calcarenite Ridges and Plains (Pendleton): *Woods* s.n., s. dat., Tattiara Country (MEL 43651). - Mt Lofty Block: (Kangaroo Island) (Gantheaume): *Coles* 23, 14.i.1965, Stunsail Boom River (AD); (Pardana): *B. & H. Conn* 1099, 16.xi.1980, Breakneck River (AD, HO, MEL, NSW); (Stokes Bay): *B. & H. Conn* 1098, 14.xi.1980, Middle River Dam (AD, BRI, CANB, MEL); (Cygnet): *Waterhouse* s.n., s. dat. Cygnet [Nepean] Bay (MEL 43647). - Flinders

Ranges: Southern Basins and Ranges (Wilpena): *Hill* 353, 25.x.1955, Wilpena Pound (AD); *Orchard* 2597, 7.xi.1970, between Madge's Hill and Edeowie Gorge, Wilpena Pound (AD). - Eyre and Yorke Peninsulas [Eyre Peninsula]: Southern Highlands and Plains (Mt Gawler): *Browne* s.n. (? 38), s. dat. Port Lincoln (MEL 43650); (Edillie): *Alcock* C52, 29.viii.1964, near Wanilla (AD); (Marble Range): *Whibley* 1866, 25.viii.1967, SE end of Marble Range (AD).

Distribution. New South Wales - North Coast; Victoria - South West; South Australia - Murray Mallee, Mt Lofty Block (Kangaroo Island), Southern Highlands and Plains (Eyre Peninsula), and Flinders Ranges. Figure 12.

Ecology. Commonly occurring in rocky areas and watercourses in association with mallee, *Eucalyptus camaldulensis, E. baxteri, E. leucoxylon, Allocasuarina verticillata* and *Callitris rhomboidea* communities. Associated understorey species include *Acacia mearnsii, A. retinodes, A. ruppii, Bauera sessilifolia, Caladenia caerulea, Correa* spp., *Daviesia* spp., *Gahnia sieberiana, Hibbertia* spp., *Isopogon* spp., *Logania* spp., *Petrophile pulchella, Pultenaea* spp., *Thryptomene calycina* and *Xanthorrhoea.* Soils usually sandy to sandy-loam, overlying sandstone or limestone. Ironstone gravel sometimes present. Once recorded growing in soils with high clay content.

Typification. Mueller does not cite any specimens for this species in the protologue (Mueller 1855a). The locality is cited as 'On springs and irrigated rocks in the Grampians' (Mueller 1855a, p. 48). At MEL there are five collections by Mueller from the Grampians (namely MEL 43662-43666). MEL 43666 has more precise locality details (namely 'Rocky declivities near springs of the Grampians') than the other specimens which merely state that they were collected from the 'Grampians'. Since MEL 43666 closely agrees with the protologue it is here chosen as the lectotype and the other specimens are regarded as probable isolectotypes.

Seberg (1986) suggests that Mueller (1855a) was published in June-July 1855 and so should be regarded as a preprint of Mueller (1855b) which was published in September.

Notes. This species is readily identified by the presence of numerous spines which are formed from reduced branches (refer 'Notes' for *P. nudula* for comparison between these two species).

The distribution of this species is fragmented into more or less isolated populations which have attained considerable homogeneity and, in several instances, represent recognizable local variants. Although these variants are not formally recognized, the main features of each are discussed below:

1. 'The Grampians' variant (including the type) - Victoria: sparsely to moderately hairy on the branches; sparsely hairy on the outer surface of the calyx, pedicels and leaves; the prophylls and the inner surface of the calyx glabrous. This variant tends to have very long pedicels [5-14(-15) mm long].

2. The 'Mt Arapiles' variant - Victoria: similar to 'The Grampians' variant from which it differs by being densely hairy (hirsute) throughout (except inner surface of calyx glabrous), with pedicels only 1-3 mm long. One collection (*Wood* s.n.) from Tattiara Country (South Australia) is identical to this variant.

3. The 'Kangaroo Island and Eyre Peninsula' variant - South Australia: very similar to 'The Grampians' variant, except that the indumentum is shorter and most parts have occasional hairs present. The inner surface of the calyx is glabrous and the pedicels are 5-8(-10) mm long.

4. 'The Flinders Ranges' variant - South Australia: sparsely hairy throughout, except that the inner surface of the calyx is glabrous. This variant is intermediate between 'The Grampians' and the 'Kangaroo Island and Eyre Peninsula' variants. The pedicels of this variant are short (2.5-3 mm long).

5. The 'Coaldale' variant - New South Wales: glabrous or scattered hairs may be present on most parts. The outer surface of the calyx is densely hairy and the inner surface is minutely hairy near margin. The branches usually are hairy at the nodes. This variant has a narrowly ovate leaf lamina (length to width ratio 3), whereas the previous variants have suborbicular to ovate leaf lamina (length to width ratio 1.1-2). The pedicels are (4-) 5-7 mm long. This variant is superficially similar to *Prostanthera nudula* (South Australia), however this latter species has unequal calyx lobes, a corolla which is white with purple streaks, and fewer spines (note: this variant has fewer spines than found in the other variants of *P. spinosa*).

Conservation status. Not considered to be endangered.

Common names. Spiny mint-bush (Ewart 1931, p. 985; Willis 1973, p. 589), Prickly Mint-Bush (Guilfoyle 1910, p. 305).

Figure 2. a-d - *Prostanthera eckersleyana*. a - Twig and flowers. b - Open corolla. c - Dissected calyx showing section of gynoecium. d - Stamens, ventral and dorsal views. (*Ashby* 3608).

4. **Prostanthera eckersleyana** F. Muell., Fragm. 10: 17 (1876); Briq., in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a: 220 (1895); C.A. Gardner, Enum. Pl. Austral. Occid. 114 (1931); Blackall & Grieve, W. Austral. Wildfl. 3: 594 (1965); J.S. Beard, Descr. Cat. W. Austral. Pl. 94 (s. dat. [Oct. 1965]); Althofer, Cradle of Incense 154, 159 & 160 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. W3B: 454 (1981); C.A. Gardner, Wildfl. W. Austral. 14th edn 122 (1981); Erickson et al., Flowers & Pl. W. Austral. 138 (1973). *Type*: *Young* s.n., s. dat., 'near Mt Churchman', Western Australia (holo: MEL 43140).

Erect, often spreading shrub, 0.2-1 m high. *Branches* terete, often slightly ridged to subquadrangular, viscid; moderately hairy [40-75 hairs/mm^2], indumentum denser on internodal surface from within the axil of each leaf to the next more distal node (between bases of leaves); hairs subpatent and curved to curled, usually retrorse (an occasional hair antrorse), sometimes straight and ± patent, 0.1-0.4(-0.8) mm long, sometimes up to 1.8 mm long on new seasons growth (indumentum ± villose with patent hairs), white, multicelled; moderately to densely glandular [58- c. 100 glands/mm^2], glands pedicellate (c. 0.3-0.8 mm long) or sessile. *Leaves* mid-green, viscid, aromatic; *petiole* (0.5-)0.8-1.5(-2) mm long, slightly expanded distally, glabrous or with an occasional hair to moderately hairy [up to c. 50 hairs/mm^2]; hairs c. 0.2 mm long; very sparsely to densely glandular, or glands absent; *lamina* very broadly angular-ovate to ovate, elliptic or oblong-elliptic, (4-)7-10 × (2-)3.4-8.5 mm [length to width ratio 1.1-1.9, length of maximum width from base to total lamina length ratio 0.2-0.4]; often incurved to conduplicate; base acute to truncate or very shortly attenuate; margin slightly undulate, ± crenate (often irregularly so), lobes ± obliquely triangular [up to c. 0.5(-1.5) mm long], antrorse with each lobe obtuse to rounded; apex obtuse; venation faint and often raised on abaxial surface, indistinct on adaxial surface, midrib raised on abaxial surface and slightly sunken to indistinct on adaxial surface; very sparsely to moderately hairy basally, denser on adaxial surface, or with scattered hairs particularly along margin and/or lobes of margin [up to c. 40 hairs/mm^2]; hairs ± straight, c. 0.3 mm long; sparsely to densely glandular (individual glands not distinguishable) [c. 23 to more than 100 glands/mm^2], glands usually sessile, rarely mostly pedicellate (*Gardner* 12031). *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 4-10-flowered [per conflorescence]. *Pedicel* 1.5-3.5 mm long, moderately to densely hairy [68-119 hairs/mm^2], hairs 0.2-0.4 mm long, moderately glandular [25-33 glands/mm^2]; *prophylls* inserted on distal half of pedicel, often near base of calyx [a_1 axis to anthopodium ratio 1.8-18.3], opposite, oblong-elliptic or elliptic, (3-)5-8 mm long, (1-)2-3 mm wide [length to width ratio 1.6-2.6(-3), length of maximum width from base to total lamina length 0.4-0.5], sparsely to moderately hairy basally, along midrib and along margin [up to c. 100 hairs/mm^2], sparsely to moderately glandular (both pedicellate and sessile glands present) [up to c. 30 glands/mm^2], base acute to subattenuate, margin entire or slightly lobed (lobes up to c. 0.6 mm long), apex obtuse. *Calyx* green with maroon to purple tinge distally; outer surface very sparsely to moderately hairy [up to c. 55 hairs/mm^2], sometimes tube glabrous, moderately glandular (both sessile and pedicellate glands present) [40-58 glands/mm^2]; inner surface glabrous in tube, except mouth and lobes which are sparsely to densely hairy [up to c. 150 hairs/mm^2], moderately glandular (glands mostly pedicellate) [c. 50 glands/mm^2]; *tube* 4.5-5.5 mm long; *abaxial lobe* very broadly oblong-ovate to broadly oblong or broadly ovate, 3.3-4.5(-5.4) mm long, 3.8-5.2 mm wide [length to width ratio 0.7-1], apex rounded, often emarginate (sinus c. 0.3 mm long); *adaxial lobe* depressed ovate to very broadly ovate, 3-5(-6.4) mm long, 5.6-7.9 mm wide [length to width ratio 0.4-0.9], apex rounded to ± obtuse, becoming recurved; [adaxial lobe length to abaxial lobe length ratio 1.1-2.5]. *Corolla* 15-24 mm long, blue, mauve to purple or violet, once recorded as yellow (*Demarz* D. 2756 - may refer to calyx), often with maroon spots on inner abaxial surface of tube; outer surface glabrous or with a few scattered hairs to very sparsely hairy [c. 5 hairs/mm^2], sparsely to moderately glandular [20-33 glands/mm^2], glands pedicellate (up to 0.3 mm long); inner surface very sparsely hairy abaxially [8- c. 17 hairs/mm^2], hairs weak, crinkled, 0.3-1.5(-2) mm long, remaining inner surface glabrous, glands absent; tube 14-18 mm long, diameter at mouth 6-7 mm; *abaxial median lobe* ± spathulate to very broadly obovate, 8-9.8 mm long, 9.2-10 mm wide [length to width ratio 0.9-1],

apex slightly irregular and rounded, often broadly retuse (sinus up to c. 0.5 mm long); *lateral lobes* very broadly ovate or broadly oblong, 3.5-6.2 mm long, 2.9-6.5 mm wide [length to width ratio 0.9-1.2], apex obtuse to rounded; *adaxial median lobe-pair* depressed ovate, 5-7.2 mm long, 10-13 mm wide [length to width ratio 0.5-0.6], apex rounded, deeply bilobed (sinus 2.5-5 mm long). *Stamens* inserted 5.5-8 mm above base of corolla; filaments 3.2-7 mm long; anthers 1-1.6 mm long, base of lobes with acumen c. 0.2 mm long, dorsally often cristate, connective extended to form a basal appendage 0.5-0.9 mm long, terminating in 1-4 narrowly triangular trichomes. *Disc* 0.5-0.8 mm high. *Pistil* 12-24 mm long; *ovary* ± cylindrical-obovoid, 1-1.5 mm long, diameter at base c. 1 mm, lobes c. 0.1 mm long, glabrous, glands absent; *style* 9-14 mm long; *stigma lobes* 0.2-0.4 mm long. *Fruiting calyx* slightly enlarged (abaxial lobe 4.6-6.2 mm long, 3.1-7.2 mm wide [length to width ratio 0.9-1.5]; adaxial lobe 6.2-10.1 mm long, 6.5-8.7 mm wide [length to width ratio 1-1.2]; [adaxial lobe length to abaxial lobe length ratio 0.7-1.3]. *Mericarps* c. 2 mm long, distally c. 1.5 mm extended beyond base of style, distal diameter 3-3.8 mm, glabrous, glands absent; seeds ± obovoid, c. 2.2 mm long, c. 1 mm wide.

Selected specimens examined (30 examined). WESTERN AUSTRALIA: Eremaean (Austin): *Gardner* 12031, 5.xii.1958, Lake Mongers, Wanarra (PERTH); (Coolgardie): *Foreman* 683, 12.ix.1984, on road to Bimbijy Station, c. 45 km N of Beacon to Kulja Road (CBG, K, MEL, NSW, PERTH); *Weber* 5193, 5194, 19.x.1975, c. 20 km SE of Mouroubra Homestead (AD, MEL). - South-West (Avon): *Ashby* 3608, 7.ix.1970, North Beacon (AD); *Blackall* 3314, 6.x.1937, 13 km N of Bencubbin (PERTH); *Conn* 2217, 18.ix.1985, c. 5 km N of Kirwan (MEL, PERTH); *Smith* 119, 19.ix.1982, 2.8 miles N of Kirwan (MEL); *Weber* 5205, 19.x.1975, c. 40 km NE of Cleary (AD, MEL).

Distribution. Endemic to the Eremaean Botanical Province (Austin & Coolgardie Districts) and South-West Botanical Province (Avon District) of Western Australia.

Ecology. Occurs in clayey laterite derived gravelly soils, commonly associated with *Melaleuca* and *Acacia* species. It also has been collected from areas with sandy soils.

Notes. P. eckersleyana is readily identified by its viscid habit and by its undulate and crenate leaves. The affinities of this species are not known.

Conservation status. Does not appear to be threatened or endangered, but sometimes recorded as locally uncommon (*Conn* 2216, *Foreman* 683).

Common name. Crinkly mintbush (Erickson et al. 1973, p.138; Grieve, in Blackall & Grieve 1981, p. 454).

5. **Prostanthera sericea** (J.M. Black) Conn, stat nov.—*Prostanthera baxteri* A. Cunn. ex Benth. var. *sericea* J.M. Black, Fl. S. Austral. 3: 491 (1926); op. cit. 2nd edn 4: 737 (1957); Chippend. Trans. & Proc. Roy. Soc. S. Austral. 82: 335 (1959); Eichler, Suppl. to Black's Fl. S. Austral. 269 (1965); Blackall & Grieve, W. Austral. Wildfl. 3: 592 (1965); Althofer, Cradle of Incense 154 & 162 (1978); Haegi, in J. Jessop (ed.), Fl. Central Austral. 310 (1981); Conn, in J. Jessop & H. Toelken (eds), Fl. S. Austral. 3: 1211, fig. 555E. *Type*: *Ramsay* s.n ., 14.vii.1891, 70 miles SW from Camp 17 at Mt Watson, Birksgate Range (Northern Arid), South Australia (holo: AD 98223526; iso: AD 97351280, MEL 42967, NSW 128286-128288).

Erect shrub, 1-1.5 m high, sometimes a small tree up to 4 m high. Branches ± terete, usually grooved, moderately to densely hairy [83-230 hairs/mm^2], appearing silver-green or grey-green; hairs ± straight, appressed, antrorse, 0.2-0.3 mm long, white or grey-green; glands absent. *Leaves* green to silver-green or grey-green, moderately to densely hairy [75-225 hairs/mm^2], hairs ± straight, appressed, antrorse, sparsely glandular or glands absent; *petiole* absent; *lamina* linear, terete or with a faint groove along adaxial surface, strongly incurved and/or deeply grooved along adaxial surface, or ± flat, 10-53 × 0.4-3.4 mm [lamina length to width ratio 10.4-75.7(-83), length of maximum width from base to total lamina length ratio 0.2-0.8], base attenuate, margin entire, apex attenuate to obtuse; venation (including midrib) not visible. *Inflorescence* a

frondose racemiform conflorescence, uniflorescence monadic, often with 1-3 accessory buds (one of these accessory buds frequently remaining rudimentary); 4-14-flowered [per conflorescence]. *Pedicel* 1.5-3(-3.7) mm long, densely hairy [141-258 hairs/mm^2], hairs 0.2-0.3 mm long, glands absent; *prophylls* inserted on central to distal half of pedicel [a_1 axis to anthopodium ratio 0.5-3.3], opposite, ± linear to narrowly oblong, rarely narrowly elliptic, 0.6-2.3(-2.6) mm long, 0.1-0.4 mm wide [length to width ratio (2.8-)5-15.3, length of maximum width from base to total lamina length ratio c. 0.1-0.5], densely hairy (as for leaves), base attenuate, margin entire, apex attenuate. *Calyx* cream; *tube* 1.7-3.5 mm long, outer surface moderately to densely hairy [83-175 hairs/mm^2], glands absent, inner surface glabrous; *abaxial lobe* depressed ovate to very broadly ovate, 1.2-2.8(-3) mm long, 1.6-5.2 mm wide [length to width ratio 0.5-1], apex rounded, often slightly undulate, sometimes retuse (sinus up to c. 0.2 mm long), outer surface moderately to densely hairy [67-167(-200) hairs/mm^2], inner surface moderately to densely hairy [70-133 hairs/mm^2]; *adaxial lobe* depressed triangular to broadly ovate, 2.1-5.4 mm long, 2.8-6.4 mm wide [length to width ratio 0.6-1.4], apex obtuse to rounded, outer surface sparsely to densely hairy [21-150 hairs/mm^2], glands absent, inner surface sparsely hairy [c. 30 hairs/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1.4-2.7]. *Corolla* 7-10 mm long, white with mauve or purple streaks on inner distal part of tube and inner abaxial surface of mouth, outer and inner surfaces sparsely hairy [18-45 hairs/mm^2]; *tube* 3.5-5.7 mm long, diameter at mouth c. 4.5 mm; *abaxial median lobe* spathulate, 3-5 mm long, 2-3.8 mm wide [length to width ratio 0.9-2.1], apex slightly irregular and rounded; *lateral lobes* very broadly ovate to ovate, 2-4.3 mm long, 1.5-2.7 mm wide [length to width ratio 1-2.3], apex obtuse to rounded; *adaxial median lobe-pair* depressed obovate to broadly obovate, 1.3-5.5 mm long, 4-6.3 mm wide [length to width ratio 0.3-1.1], apex irregular and rounded, bilobed (sinus 0.7-2.5 mm long). *Stamens* inserted 1-2.4 mm above base of corolla; filaments 2.2-4 mm long, glabrous; anthers 0.6-1.5 mm long, connective extended to form a basal appendage 0.4-1 mm long, distally tapering into a narrowly triangular trichome. *Disc* c. 0.4-0.5 mm high. *Pistil* 5-8 mm long; *ovary* cylindrical-obovoid, 0.3-0.6 mm long, diameter at base c. 0.5-0.7 mm, lobes c. 0.1 mm long, sparsely to moderately glandular distally, sometimes nonglandular hairs also present; *style* 4.5-7 mm long; *stigma lobes* c. 0.4-0.6 mm long. *Fruiting calyx* enlarged (abaxial lobe 2-4 mm long, 2.7-6.4 mm wide [length to width ratio 0.6-0.9]; adaxial lobe 4.7-13 mm long, 4-9 mm wide [length to width ratio 0.9-2.2]; [adaxial lobe length to abaxial lobe length ratio 2-3.3]). *Mericarps* 1-1.5 mm long, distally 0.4-0.5 mm extended beyond base of style, distal diameter 1.8-2 mm, distal and adaxial surfaces moderately glandular [33-68 glands/mm^2]; seeds ellipsoid-cylindrical, c. 1.5 mm long, c. 0.8 mm wide.

Selected specimens examined. (Refer under 'Notes' on the two variants of this species).

Distribution. Occurs in the Northern Arid (Western Sandplains) province of South Australia, the Central South region of the Northern Territory, and the Eremaean Botanical Province (Carnegie, Giles & Helms Districts) of Western Australia. Figure 11.

Ecology. Occurs in open *Eucalyptus gongylocarpa* woodland between sand dunes, on the slopes of granitic hills with *Grevillea*, *Eremophila*, *Acacia* and *Triodia* species in skeletal soils, or in red sands overlying red sandstone with *Cassia artemisioides*.

Notes. This species is characterized by two main variants. Although these variants do not appear to be worthy of formal recognition, the main features of each are discussed below.

1. The 'terete leaf' variant (including the Type): This variant has terete leaves or leaves which only have a faint groove along their adaxial surface (0.6-1.1 mm wide); the branches and leaves are silver-green; the indumentum is white. Other features which might be of taxonomic significance include: anthers 0.6-1 mm long and style c. 4.5 mm long. This variant occurs in South Australia, the Bloods Range and Mt Rawlinson area of the Northern Territory, and in Western Australia.

Selected specimens examined (33 examined). SOUTH AUSTRALIA: Northern Arid: Western Sandplains (Victoria Desert): *Donner* 7461, 27.viii.1980, 72.5 km W of Vokes Corner (AD); *Jackson* 1449, 24.viii.1980, c. 30 km W of NCSSA Camp 3 (Vokes-Serpentine road)(AD); *Williams* 10544, 20.vii.1979, 65 km W of Vokes Hill road junction (AD).

NORTHERN TERRITORY: Central South: *Butler* 3, -.iv.1967, Shaw River (PERTH); *Donner* 4458, 26.viii.1973, c. 18 km N of Docker Aboriginal Mission (AD); *Henry* 416, 10.iv.1972, Bloods Range (AD, BRI); *Johnson* 5106, 3.x.1958, near Mt Rawlinson, Blackstone area (PERTH); *Munir* 5173, 25.viii.1973, on top of Bloods Range (AD); *Munir* 5174, 26.viii.1973, Bloods Range (AD).

WESTERN AUSTRALIA: Eremaean (Giles): *Beauglehole* 60503, 21.ix.1978, 3 km E of Rebecca Creek (MEL); *Munir* 5190, 27.viii.1973, Mt Ant (AD); (Carnegie): *George* 8214, 2.x.1966, 2 miles W of [Gunbarrel Highway] junction [with road to Warburton] N of Warburton (PERTH); (Helms): *Beauglehole* 60102, 18.ix.1978, 208 km by road SW of Warburton Mission (MEL); *Beauglehole* 60125, 18.ix.1978, 171 km by road SW of Warburton (MEL); *George* 8453, 11.x.1960, 40 miles E of Neale Junction (PERTH); *Forde* 1397, 15.x.1960, 5 miles NW of Point Newland (CANB).

2. The 'incurved leaf' variant - Northern Territory: This variant has incurved leaves (0.4-1.4 mm wide) such that they appear to be terete; the branches and leaves are silvery grey-green to blue-green; the indumentum is grey-green. The anthers are larger than those of the 'terete leaf' variant (1-1.5 mm long cf. 0.6-1 mm long); and the style is longer for this variant (c. 6-7 mm long cf. c. 4.5 mm long). Many of the collections examined lacked flowers. Therefore, the small sample available may exaggerate the 'differences' between these two variants. This variant is endemic to the Northern Territory.

Selected specimens examined (35 examined). NORTHERN TERRITORY: Central South: *Carr* (& *Beauglehole*) 1386, 8.vi.1974, Serpentine Gorge (AD); *Hill* & *Lothian* 927, 15.vii.1958, Palm Valley (AD); *Latz* 1907, 27.xii.1971, Gorge N of Larapinta Waters (AD, MEL); *Lazarides* 6128, 5.x.1956, 11 miles S of Tempe Downs (AD, BRI, CANB, MEL, NSW, PERTH, US); *Nelson* 1530, 8.viii.1967, Standley Chasm area (AD); *Willis* s.n., 20.vii.1966, Mt Sonder (MEL).

The relationship between *P. sericea* (particularly the 'incurved leaf' variant) and *P. althoferi* ssp. *longifolia* is unclear. Detailed population studies are required of both species, particularly in the Northern Territory, so that a re-evaluation of their circumscriptions can be undertaken.

The 'terete' variant is occasionally cultivated.

Conservation status. Not known. It is thought to be probably not at risk, although locally it is often very rare.

6. **Prostanthera campbellii** F. Muell., S. Sci. Rec. 2: 252 (1882) [as '*P. campbelli*']; C.A. Gardner, Enum. Pl. Austral. Occid. 114 (1931); Blackall & Grieve, W. Austral Wildfl. 3: 592 (1965); J.S. Beard, Descr. Cat. W. Austral. Pl. 94 (s. dat. [Oct. 1965]); Althofer, Cradle of Incense 154, 161 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 452 (1981). *Lectotype* (here chosen): *J. Forrest* s.n., s. dat. [-.v-x.1882 (Crowley 1971, p. 118)], Gascoyne River, Western Australia (lecto: MEL 42995; probable isolecto: *J. Forrest* s.n., anno 1882 (-.v-x.1882), Gascoyne River - MEL 42996).

Erect, compact to spreading shrub, 0.6-1.5 m high. *Branches* subangular to terete, sparsely to moderately hairy [(45-)100-183.3(-214.8) hairs/mm^2], rarely glabrous; hairs ± straight, appressed, antrorse, 0.1-0.2 mm long, white; glands absent. Leaves yellow-green (*Chinnock* 5210, 8427), glabrous or sparsely to moderately hairy (rarely densely hairy [up to c. 67(-133) hairs/mm^2], glands absent; *petiole* absent; *lamina* linear, 10.9-28(-35) × 0.5-1.3 mm [lamina length to width ratio 13.9-39, length of maximum width from base to total lamina length ratio (0.3-)0.4-0.7(-0.8)], base attenuate, margin entire, usually strongly incurved, apex ± attenuate; venation (including midrib) not visible. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic, often with 1 or 2 accessory buds (one of these accessory buds frequently remaining rudimentary);

Figure 3. a - *Prostanthera verticillaris*. Twig and flowers. b - *P. campbellii*. - Twig and flowers (*Chinnock* 5210). c - *P. canaliculata*. - Twig and flowers (*Maxwell* 152).

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2-16-flowered (if include accessory buds then up to c. 32-flowered) [per conflorescence]. *Pedicel* (0.6-)1.3-3.2 mm long, moderately to densely hairy [(33.3-)50-241.7 hairs/mm^2], hairs 0.1-0.2 mm long, glands absent; *prophylls* with variable insertion point on pedicel, usually inserted on basal half of pedicel, however often on distal half [a_1 axis to anthopodium ratio 0.2-1.4(-2.8)], opposite, narrowly elliptic to linear, 0.5-1.6 mm long, 0.1-0.2 mm wide [length to width ratio 3-15.3, length of maximum width from base to total lamina length ratio up to c. 0.7], moderately to densely hairy (as for pedicel), base attenuate, margin entire, apex subattenuate. *Calyx* green (*Lullfitz* L. 2886); *tube* 2-4 mm long, outer surface glabrous or densely hairy (at least on adaxial surface) [100-230 hairs/mm^2], glands absent, inner surface glabrous basally, distally moderately hairy [c. 50-83 hairs/mm^2 or glabrous throughout, moderately glandular basally [c. 80 glands/mm^2]; *abaxial lobe* depressed ovate to very broadly ovate, 1.1-2.9 mm long, 1-4.6 mm wide [length to width ratio 0.4-1.1], apex rounded, outer surface densely hairy (rarely sparsely hairy [103-231 hairs/mm^2] or glabrous, glands absent, inner surface moderately to densely hairy distally (rarely sparsely hairy) [(8.3-)23-116.7 hairs/mm^2] or sometimes glabrous, sparsely glandular basally [c. 25-30 glands/mm^2]; *adaxial lobe* depressed ovate to ovate, 2-6.5(-8.3) mm long, (2.5-)3-7.5 mm wide [length to width ratio (0.3-)0.6-1.7], apex obtuse to subrounded, outer surface glabrous or sparsely hairy [1.4-16.7 hairs/mm^2], glands absent, inner surface sparsely to moderately hairy at base [4.9-83 hairs/mm^2], rarely glabrous; [adaxial lobe length to abaxial lobe length ratio 1-3.3]. *Corolla* 6.5-10 mm long, white to cream-coloured with purple striations on inner surface of tube and/or mouth and base of lobes, inner surface of abaxial median lobe with a yellow blotch; outer surface glabrous basally, sparsely to moderately hairy distally [33-116 hairs/mm^2]; inner surface sparsely to densely hairy [c. 30-186 hairs/mm^2], rarely glabrous; hairs of outer surface ± straight, 0.1-0.3 mm long; hairs of inner surface weak and loosely tangled, 0.5-0.8 mm long; glands absent; *tube* (2.4-)3-6.2 mm long, diameter at mouth 2.5-3 mm; *abaxial median lobe* spathulate or very broadly obovate to obovate, (1.4-)2.5-4.6(-5.5) mm long, (1.2-)2-4.2 mm wide [length to width ratio 0.8-1.8], apex slightly irregular and rounded, often slightly emarginate (sinus up to c. 0.1 mm long); *lateral lobes* broadly obovate to oblong, ovate or obovate, (1.2-)2-4.3 mm long, 1-3(-3.5) mm wide [length to width ratio 1.1-1.7], apex rounded; *adaxial median lobe-pair* depressed ovate or depressed obovate to very broadly ovate or very broadly obovate, rarely obovate, (1.3-)2-5 mm long, 2-6.5 mm wide [length to width ratio 0.4-0.8 (-1.4)], apex slightly irregular and rounded, bilobed (sinus 0.7-2.5 mm long). *Stamens* inserted (1.6-)2-3.5 mm above base of corolla; filaments 2-3.3 mm long, glabrous; anthers 0.5-1.3 mm long, purple laterally, base of lobes with a minute acumen c. 0.1 mm long, connective extended to form a basal appendage 0.2-0.7 mm long, or appendage absent, appendage (when present) tapering distally into a single narrowly triangular trichome (often with 1-3 smaller trichomes laterally). *Disc* 0.1-0.3 mm high. *Pistil* 5.5-6 mm long; *ovary* obovoid, 0.5-0.7 mm long, diameter at base c. 0.6 mm, lobes 0.1-0.2 mm long, densely glandular distally; *style* 5-5.7 mm long; *stigma lobes* c. 0.5 mm long. *Fruiting calyx* enlarged (abaxial lobe [(? immature) 4.5-]5-14.3 mm long, 6-11.7 mm wide [length to width ratio 0.7-1.3]; adaxial lobe [(? immature) 2.5-]3-5.2 mm long, 3.9-5.9 mm wide [length to width ratio 0.5-0.9]; [adaxial lobe length to abaxial lobe length ratio 0.3-0.5]). *Mericarps* 2-2.4 mm long, distally extended c. 0.5 mm beyond base of style, distal diameter 2-2.3 mm, distal half densely glandular [100-134 glands/mm^2]; seeds ellipsoid-cylindrical, c. 1.4-1.7 mm long, c. 0.8 mm wide. Figure 3b.

Selected specimens examined (37 examined). WESTERN AUSTRALIA: Eremaean (Ashburton): *Chinnock* 4827, 25.ix.1979, 78.1 km SE of Mt Vernon (AD, MEL); (Austin): *Ashby* 4749, 28.vii.1973, c. 47 km E of Meekatharra (AD, MEL); *Chinnock* 5210, 19.x.1981, 63 km ENE of Payne's Find on Sandstone road (AD, MEL); *Corrick* 9095, 28.ix.1984, 31 km S of Menzies on Kalgoorlie road, near Comet Vale (HO, MEL); (Coolgardie): *Webster* s.n., 21.x.1901, Coolgardie (CANB, E, K, PERTH); *Helms* s.n., 12.xi.1891, Gnarlbine (AD, K, MEL, NSW); *Saffrey* 1506, 30.x.1970, 7 miles N of Widgiemooltha (PERTH); *Short* 1953, 6.x.1983, Gnarlbine Rock (MEL PERTH, RSA); (Helms): *Butler* s.n., -.v.1959, Queen Victoria Springs (US). - South-West (Irwin):

Phillips CBG 25859 , 17.ix.1968, c. 14 miles S of Wannoo (PERTH); (Avon): *Lullfitz* L3097b, 6.xii.1963, 4 miles from Warralakin (KP, PERTH); Victor s.n., 26.x.1910, Kununoppin (K).

Distribution. Endemic to the Eremaean Botanical Province (Ashburton, Austin, Coolgardie & Helms Districts) and South-West Botanical Province (Avon & Irwin Districts) of Western Australia. Figure 12.

Ecology. Occurs in red sandy soils associated with granitic outcrops (*Short* 1953), jasperlite ridges (*Speck* 1451), with *Acacia* species, *Eremophila elderi* (*Chinnock* 4827), *Triodia* and *Hakea multilineata* (*Corrick* 9095). *Chinnock* 5210 records this species from 'Red-brown clay loams under mulga'.

Notes. This species is closely related to *P. baxteri* and *P. canaliculata*. *P. campbellii* has leaves with length to width ratios of 13.9-39 [cf. *P. baxteri* (2.5-)3-13; *P. canaliculata* 2.7-5.3]; prophylls moderately to densely hairy [cf. *P. baxteri* glabrous or with an occasional hair; *P. canaliculata* glabrous]; anthers more or less smooth, not cristate dorsally [cf. both *P. baxteri* and *P. canaliculata* cristate]; corolla with purple striations and yellow spots [cf. *P. baxteri* mid-brown to dull orange spots; *P. canaliculata* lacking markings]; fruiting calyx enlarged - fruiting abaxial calyx lobe to flowering abaxial calyx lobe ratio (1.7-)2-2.5 [cf. *P. baxteri* and *P. canaliculata* unchanged or only slightly enlarged - fruiting abaxial calyx lobe to flowering abaxial calyx lobe ratio 1-1.4].

In *P. campbellii* there are usually 1 or 2 accessory buds present in at least some of the uniflorescences of a conflorescence. Therefore, the uniflorescences are 1-3-flowered, whereas those of the other two species appear to be consistently monadic.

The presence or absence of an anther appendage is extremely variable even in the flowers of one specimen.

This species also has close affinities with *P. petrophila* (refer 'Notes' of the latter species for discussion of similarities and differences).

Conservation status. Not known. Recorded as abundant (*Chinnock* 4827, *Corrick* 9095) and once recorded as uncommon (*Chinnock* 5210).

7. **Prostanthera canaliculata** F. Muell., Fragm. 6: 105 (1868); Benth., Fl. Austral. 5: 102 (1870); C.A. Gardner, Enum. Pl. Austral. Occid. 114 (1931); Blackall & Grieve, W. Austral. Wildfl. 3: 592 (1965); Beard, Descr. Cat. W. Austral. Pl. 94 (s. dat. [Oct. 1965]); Althofer, Cradle of Incense 154 & 161 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 452 (1981). *Lectotype* (here chosen): *Maxwell* s.n., s. dat., 'Fitzgerald Echo, Fitzgerald River', Western Australia (lecto: MEL 43004). *Other syntypes*: *Drummond* (Collection s.n.) 343, s. dat. [1849], s. loc. ['flumen Murchisonii versus', Mueller 1868, p. 105] (MEL 43005, OXF - photo); *Mueller* s.n., -.x.1867, 'Heaths on the Upper Kalgan [River]' (MEL 43003).

Erect shrub, 0.3-0.6(-1.2) m high. *Branches* terete, densely hairy (rarely sparsely hairy) [(25-)60-184 hairs/mm^2], usually appearing whitish; hairs ± straight, appressed and antrorse, 0.1-0.3 mm long, white; glands absent. *Leaves* silver-green or green, glands absent; *petiole* absent or up to 0.5(-0.8) mm long, densely hairy (as for branches); *lamina* narrowly ovate to narrowly elliptic, 3.8-7(-9.8) × 0.9-1.6 mm [length to width ratio 2.7-5.3, length of maximum width from base to total lamina length ratio 0.2-0.4(-0.7)], slightly thickened, base subattenuate to obtuse, margin entire, usually strongly incurved, apex obtuse; venation (including midrib) not visible; abaxial surface glabrous or sometimes with an occasional hair; adaxial surface sparsely to moderately hairy [4-50(-76.7) hairs/mm^2] or glabrous, hairs ± straight, appressed and antrorse, 0.1-0.3 mm long, white; (petiole length to lamina length ratio up to 0.1). *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 2-16-flowered [per conflorescence]. *Pedicel* 1-1.6 mm long, glabrous or with a few scattered hairs distally, glands absent; *prophylls* usually inserted on basal half of pedicel to about halfway up

pedicel, rarely inserted on distal half [a_1 axis to anthopodium ratio 0.2-1.4(-10)], opposite, soon deciduous or undeveloped, narrowly elliptic, narrowly obovate to almost linear, 0.3-0.8(-1.2) mm long, 0.1-0.3(-0.4) mm wide [length to width ratio 3-7, length of maximum width from base to total lamina length ratio up to 0.6], glabrous, base attenuate, margin entire, apex subattenuate. *Calyx* ? green with mauve, purple to dark green tinge on adaxial lobe [interpretated from *Canning* CBG 38744 & *Muir* 4136]; tube 2-3.1 mm long, outer surface glabrous or with a few scattered hairs distally; *abaxial lobe* depressed ovate, rarely perdepressed subtriangular, 1.3-2.2 mm long, 2.3-4.4 mm wide [length to width ratio (0.3-)0.4-0.7], apex obtuse, outer surface glabrous except for occasional hairs near margin, glands absent, inner surface densely hairy [c. 100-150 hairs/mm^2]; *adaxial lobe* depressed ovate to very broadly ovate, 1-1.6 mm long, 1.7-2.9 mm wide [length to width ratio 0.4-0.8], apex obtuse, outer surface glabrous except for occasional hairs near margin, glands absent, inner surface densely hairy [c. 300 hairs/mm^2]; [adaxial lobe length to abaxial lobe length ratio 0.7-1]. *Corolla* 6.5-10 mm long, pale violet, pale blue to white, lacking markings, outer surface glabrous on tube and moderately to densely hairy on lobes [38-150 hairs/mm^2], glands absent, inner surface glabrous on tube and moderately hairy on lobes [30- c. 50 hairs/mm^2], glands absent; *tube* 2.9-6.9 mm long, diameter at mouth 3-4 mm; *abaxial median lobe* spathulate, 3.1-5.2 mm long, 3.2-5.2 mm wide [length to width ratio 0.8-1.2], apex irregular and rounded, usually retuse (sinus c. 0.4 mm long); *lateral lobes* broadly ovate to ovate, 2-4.2 mm long, 1.2-3.1 mm wide [length to width ratio 1-2], apex obtuse; *adaxial median lobe-pair* depressed ovate to very broadly ovate, 1.6-3.3(-5.2) mm long, 3.4-4.7(-7.8) mm wide [length to width ratio 0.4-0.7], apex irregular and rounded, retuse to bilobed (sinus 0.3-1.1(-2.6) mm long). *Stamens* inserted (1.9-)2.4-3.3 mm above base of corolla; filaments 1.5-2.9 mm long, glabrous; anthers 0.7-1.3 mm long, lobes cristate on basal dorsal surface and with small acumen basally, connective extended to form a basal appendage 0.6-1 mm long, terminating in 3-6 narrowly triangular trichomes. Disc c. 0.2 mm high. *Pistil* 4.5-5 mm long; *ovary* cylindrical-obovoid, c. 0.5 mm long, diameter at base 0.5-0.6 mm, lobes c. 0.1 mm long, glands absent; *style* 3.6-4.1 mm long; *stigma lobes* c. 0.4 mm long. *Fruiting calyx* unchanged or very slightly enlarged (abaxial lobe 1.8-2.3 mm long, (2.6-)3-4.5 mm wide [length to width ratio 0.5-0.8]; adaxial lobe 1.3-2 mm long, 1.7-3.4 mm wide [length to width ratio 0.4-1]; [adaxial lobe length to abaxial lobe length ratio 0.6-0.9]). *Mericarps* 1.8-2 mm long, distally 0.5-1 mm extended beyond base of style, distal diameter 2.3-2.7 mm, glands absent; seeds ellipsoid-cylindrical, c. 1.1-1.3 mm long, c. 0.5 mm wide. Figure 3c.

Selected specimens examined (20 examined). WESTERN AUSTRALIA: South-West (Avon): *Maiden* s.n., -.ix.1909, Tammin (F); *Sewell* s.n., anno 1890, Mt Caroline (MEL 43878); (Roe): *Gardner* 13818, 28.x.1961, Pingrup (PERTH); (Eyre): *Drummond* 4th Collection 166, s. dat. [anno 1847 (Erickson 1969, p. 168)], Cape Riche (LE); *Drummond* 4th Collection 166, anno 1848 [1847], South West Australia [possibly Cape Riche] (MEL 43000, NSW, PERTH); *Drummond* [4th Collection] 166, anno [18]48 [1847], Swan River [Colony] (P); *Gardner* s.n., -.ix.1926, Phillips River (PERTH); *Canning* (CBG 38744) s.n., 11.xi.1968, West River (AD); *Gardner* 13772, 26.x.1961, West River (PERTH); *Muir* 4136, 3.x.1966, West River (MEL); (Darling - Kalgan River): *Mueller* s.n., -.x.1867, (MEL 43003); *Oldfield* s.n., s. dat. (MEL 43001).

Distribution. Endemic to the South-West Botanical Province (Avon, Darling, Eyre & Roe Districts) of Western Australia. Figure 12.

Ecology. Occurs in heath communities, in sandy soils (*Muir* 4136, *Newbey* 1891) and amongst granitic rocks (*Gardner* 13772).

Notes. The features which characterize this species are: the small flowers; the outer surface of the calyx is glabrous (except for occasional hairs at base and margin); the calyx does not enlarge or only slightly during fructescence; the inner surface of the corolla is moderately hairy; the pistil lacks glands and hairs; the prophylls are undeveloped, soon deciduous (often while flowers are in bud, almost never present in fruiting material), very small; and the leaves are smaller (e.g. shorter, with length to width ratio smaller)

than for *P. campbellii*. Refer 'Notes' for *P. campbellii* for further explanations of differences between these two species. *P. canaliculata* has its closest affinities with *P. baxteri* and *P. campbellii*.

The prophylls develop at a slower rate than the flower. Flower buds which are almost ready to open often have only rudimentary or very small prophylls present. Sometimes the prophylls do not develop beyond a rudimentary swelling on the pedicel.

Bentham (1870) described *P. canaliculata* var. *canosericea* based on very inadequate material. The status of this taxon can not be resolved until adequate material is available (refer 'Species of Uncertain Position').

Conservation status. Not known.

8. **Prostanthera baxteri** A. Cunn. ex Benth., Labiat. Gen. Spec. 452 & 453 (1834); D. Dietr., Syn. Pl. 3: 427 (1842); Walpers, Rep. Bot. Syst. 3: 767 (1844); Benth. in DC., Prodr. 12: 561 (1848); F. Muell., Fragm. 6: 106 (1868); Benth., Fl. Austral. 5: 102 (1870); C.A. Gardner, Enum. Pl. Austral. Occid. 114 (1931); Blackall & Grieve, W. Austral. Wildfl. 3: 593 (1965) (p.p. incl. *P. althoferi*); Althofer, Cradle of Incense 154 (p.p. incl. *P. althoferi* ssp. *longifolia*), 158 (p.p. incl. *P. althoferi* ssp. *longifolia*), 159, 160, 162 (p.p. incl. *P. althoferi* ssp. *longifolia*) (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 451 (1981)(p.p. incl. *P. althoferi*). *Lectotype* (here chosen): *Baxter* s.n., anno 1829, 'somewhere on the S°. Coast of Aust[a].' [King George's Sound' (Bentham 1834, p. 452)] [Western Australia] (lecto: K - upper right specimen). *Probable syntype; Baxter* s.n., s. dat. [?1829] (see Typification). Thomas River [Western Australia] (K - lower three specimens, excl. lectotype; MEL 42970) [see 'Typification'].

P. baxteri var. *crassifolia* Benth., Fl. Austral. 5: 102 (1870); Blackall & Grieve, W. Austral. Wildfl. 3: 593 (1965); Althofer, Cradle of Incense 154 (p.p. incl. *P. althoferi* ssp. *longifolia*) & 162 (p.p. incl. *P. althoferi* ssp. *longifolia*) (excl. p. 158 - refers to *P. althoferi* ssp. *longifolia*) (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 452 (1981). *Lectotype* (here chosen): *Maxwell* s.n., s. dat., Eyres Range, Western Australia (lecto: MEL 42962). *Other syntype*: *Maxwell* s.n., s. dat, Phillips Flats, Phillips River [Western Australia] (MEL 42965).

Erect shrub, 0.3-1.3 m high. *Branches* subangular to terete, densely hairy [88-185(-208) hairs/mm^2], usually appearing whitish; hairs ± straight, appressed, antrorse, 0.2-0.4 mm long, white; glands absent. *Leaves* green, sparsely to densely hairy [16.7-92(-121) hairs/mm^2], rarely with only a few scattered hairs [up to 4.5 hairs/mm^2] or glabrous, hairs ± straight, appressed, antrorse, glands absent; *petiole* absent; *lamina* narrowly ovate to linear, 4.8-15 × 0.9-2(-4.3) mm [length to width ratio (2.5-)3-13, length of maximum width from base to total lamina length ratio 0.1-0.7], base obtuse to subattenuate, margin entire and incurved, apex obtuse; venation (including midrib) not visible. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 8-14-flowered [per conflorescence]. *Pedicel* 1.2-3.8 mm long, densely hairy [(116-)158-283.3 hairs/mm^2], hairs 0.2-0.3 mm long, glands absent; *prophylls* inserted on distal half of pedicel [a$_1$ axis to anthopodium ratio (0.4-)0.7-10], opposite, narrowly elliptic, narrowly obovate to linear, 1-3.9 mm long, 0.2-0.7 mm wide [length to width ratio (2-)4-11.7(-14), length of maximum width from base to total lamina length ratio 0.3-0.7], with occasional hairs [up to c. 6 hairs/mm^2] or glabrous, base attenuate, margin entire and incurved, apex obtuse. *Calyx* green with maroon tinge on abaxial surface; tube 2.1-3.8(-4.3) mm long, outer surface densely hairy on adaxial surface [83-195(-227) hairs/mm^2], abaxial surface glabrous or with an occasional hair [up to c. 9 hairs/mm^2], glands absent, inner surface glabrous; *abaxial lobe* very broadly ovate to broadly ovate, 2.8-4.5 mm long, (3-)3.6-6.1 mm wide [length to width ratio 0.6-1.1], apex obtuse, outer surface sparsely hairy (rarely moderately hairy) [3.4-30(-75) hairs/mm^2] or glabrous, glands absent, inner surface moderately to densely hairy [72-167 hairs/mm^2]; *adaxial lobe* very broadly ovate to broadly ovate or broadly oblong, rarely ovate, 1.5-3.2 mm long, (1.4-)1.6-2.9 mm wide [length to width ratio 0.7-1.3(-1.7)], apex obtuse, rarely subacute, outer surface moder-

ately to densely hairy [(66-)83-227 hairs/mm^2], glands absent, inner surface moderately to densely hairy [as for outer surface]; [adaxial lobe length to abaxial lobe length ratio 0.3-0.8]. *Corolla* 10.5-13 mm long, white, with tinge of blue to pale mauve on tube, darker on outer abaxial surface, mid-brown to dull orange spots along medial line on inner abaxial surface of throat to base of abaxial median lobe, with 2 additional mid-brown spots at base of abaxial median lobe, outer surface glabrous or sparsely hairy [up to c. 14 hairs/mm^2] on tube, and densely hairy on lobes [81-100 hairs/mm^2], glands absent, inner surface of tube glabrous, lobes sparsely to densely hairy [20-80 hairs/mm^2], glands absent; *tube* 4.5-7.4 mm long, diameter at mouth 4-5 mm; *abaxial median lobe* spathulate, 2.7-5.6 mm long, 1.9-5.7 mm wide [length to width ratio 0.8-1.6], apex slightly irregular and rounded, ± bilobed (sinus 0.2-1 mm long); *lateral lobes* very broadly ovate to ovate, sometimes broadly obovate, 1.8-4.6 mm long, 2.1-3.8(-4.8) mm wide [length to width ratio 0.8-2.1], apex obtuse; *adaxial median lobe-pair* depressed ovate or rarely transverse-oblong, to ovate, 1.9-3.9 mm long, 2.2-6(-7.2) mm wide [length to width ratio 0.5-0.6(-1.1)], apex irregular and rounded, bilobed [sinus (0.4-)0.8-1.9 mm long]. *Stamens* inserted (1.7-)2-4(-5.2) mm above base of corolla; filaments (1.5-)2-4.2 mm long, glabrous; anthers 0.7-1.4 mm long, lobes cristate on basal dorsal surface, connective extended to form a basal appendage 0.5-1.1 mm long, terminating in 4 or 5 narrowly triangular trichomes. *Disc* 0.3-0.5 mm high. *Pistil* 6-7 mm long; *ovary* cylindrical-obovoid, 0.6-0.7 mm long, diameter at base 0.7-0.8 mm, lobes 0.1-0.5 mm long, glabrous and glands absent; *style* 5.2-6 mm long; *stigma lobes* 0.4-0.5 mm long. *Fruiting calyx* unchanged or only slightly enlarged (abaxial lobe 2.9-6.2 mm long, 3.9-6 mm wide [length to width ratio 0.6-1.2]; adaxial lobe 2-3.4 mm long, 2-3.9 mm wide [length to width ratio 0.7-1.2]; [adaxial lobe length to abaxial lobe length ratio 0.5-0.9]). *Mericarps* 2-2.5 mm long, distally 0.9-1.2 mm extended beyond base of style, distal diameter c. 2 mm, glands absent; seeds ellipsoid-cylindrical, c. 1.5 mm long, c. 0.8 mm wide. Figure 4a.

Selected specimens examined (27 examined). WESTERN AUSTRALIA: South-West (Roe): *Hill & Jordan* s.n., -.ix.1953, Ongerup (AD); (Eyre): *Andrews* s.n., -.x.1903, Hammersley [River] (NSW 128378); *Barker* 2560, 21.x.1968, 58 km N of mouth of Oldfield River (AD, MEL); *Beard* 5334, 28.x.1967, Mt Baring (KP, PERTH); *Blackall* s.n., -.ix.1930, Gibson's Soak (PERTH); *Gardner* 1818 , 17.ix.1925, Phillips River (PERTH); *Gardner* 12944, 23.x.1960, Thomas River (PERTH); *Haegi* 1226, 6.x.1976, c. 62 km ENE of Esperance (AD, MEL); *Muir* 4260, 6.x.1966, Cape le Grande (MEL); *Newbey* 2733, 27.x.1967, Thumb Peak (PERTH); *Orchard* 1419, 9.x.1968, Lort River (AD, MEL, PERTH); *Royce* 3683, 13.viii.1951, 23 miles W of Ravensthorpe (PERTH); *Royce* 9870, 29.xi.1971, Cape Arid National Park (PERTH).

Distribution. Endemic to the southern South-West Botanical Province (Eyre & Roe Districts) of Western Australia. Figure 14.

Ecology. Occurs in dark to light (yellow - *Gardner* 1818) sandy soils, often in shallow pans over granite or amongst granite outcrops in Mallee and Heath communities.

Typification. An herbarium sheet at K contains five specimens collected by Baxter. In the upper right of this sheet the label (in A. Cunningham's hand) states that 'shrub discovered by Mr. Wm. Baxter, somewhere on the S^{o}. coast of Aust^{a}. [Australia] in 1829. Who gave me this solitary specn. [specimen].' Although there are now two specimens on this part of the sheet, it is assumed that these were originally part of a single collection. It is assumed that the locality cited on this label (see above) is comparable to 'King George's [Georges] Sound' as cited in the protologue (Bentham 1834, p. 453).

The other three specimens, which are mounted lower on this sheet, were collected by Baxter from the 'Thomas river' area (specimen also in MEL 42970). These can probably be regarded as syntype material. The label on the Kew sheet of the 'Thomas river' collections has 'F. Mueller 1869' written by an unknown hand. It is presumed that this refers to the date that this specimen was either sent by Mueller to Bentham or the date that it was received by Bentham from Mueller. It is not the date of collection because Baxter left Australia in 1830 and died before 1836 (Desmond 1977, and references therein).

Notes. The circumscription of this species has been progressively broadened and changed by most authors since Bentham (1834). Likewise, Bentham's concept of *P. baxteri* var. *crassifolia* (Bentham 1870, p. 102) has been changed so much that it now refers to a different taxon (namely *P. althoferi*). This name is reduced to synonymy because it is merely a variant which has slightly more fleshy leaves (hence broader) and it is often less hairy than typical *P. baxteri.*

This species is closely related to *P. campbellii* and *P. canaliculata.* The three species are sometimes difficult to distinguish from each other. Refer 'Notes' under *P. campbellii* for differences between these three taxa.

Conservation status. Not known. Once recorded as an occasional shrub (*Haegi* 1226).

Figure 4. a - *Prostanthera baxteri.* Twig and flowers (*Barker* 2560). b - *P. althoferi* ssp. *althoferi.* Twig and flowers (*Weber* 4752). c - *P. althoferi* ssp. *longifolia.* Twig and flowers (*Chinnock* 2641).

9. **Prostanthera althoferi** Conn, sp. nov. (Figure 4b)

Species nova Sectionis *Prostantherae*. *Frutices* circa 0.5-3 m alti. *Rami* et ramuli teretes usque subquadrangulares, pilis densis vestita, argentei cano-virides, pilis 0.2-0.5 mm longis, glandibus absentibus. *Folia* argentei cano-virides, pilis densis vestita; *petiolus* absens vel usque ad 0.4 mm longus; *lamina* anguste obovata usque linearis, raro obovata, 7.3-36(-43) mm longa, 1.2-2.5(-3.4) mm lato, basi attenuata, margine integro, apice obtuso, raro subrotundato. *Pedicellus florum* 0.9-3.3(-4.2) mm longus, pilis densis vestita, pilis 0.2-0.4 mm longis, glandibus absentibus; *prophyllis* anguste oblongis usque linearibus, 0.7-3.6 mm longis, 0.1-0.4 mm latis. *Tubus calycis* 1.8-4 mm longus, extra pilis moderatis usque densis vestita, glandibus absentibus, interius glaber vel pilis sparsis vestita distaliter; *lobus abaxialis* depresse ovatus usque latissime ovatus, (1.2-) 1.8-2.9 mm longus, 2-4 mm latus, apice rotundato, saepe leviter undulato, extra pilis moderatis usque densis vestita, glandibus absens, interius pilis moderatis usque densis; *lobus adaxialis* latissime ovatus usque ovatus, interdum subdepresse ovatus, (2-)3.4-5.6 mm longus, 2.6-6.5 mm latus, apice obtuso usque rotundato, extra pilis sparsis usque densis vestita, glandibus absentibus, interius pilis moderatis usque densis vestita. *Corolla* 6.5-9(-10) mm longa, plus minusve alba, striis malvinis vel purpureis in interius pagina, interius pilis sparsis usque moderatis vestita: *tubus* 3.4-6.5 mm longus; *lobus abaxiali-medianus* spathulatus vel latissime obovatus usque subobovatus, 3.3-6.6 mm longus, 2.7-5.5 mm latus, apice irregulari et rotundato, *lobis lateralibus* latissime obovatis vel subcircularis usque obovatis, oblongibus, latissime ovatis usque ovatis, vel latissime ellipticus, 2.2-5.1(-6) mm longis, 1.5-3.6 mm latis, apice obtuso usque rotundato et saepe leviter irregulari, *pari loborum adaxiali-mediano* depresse obovato usque latissime obovato, 2.6-5(-6) mm longo, 4-7.3(-7.8) mm lato, apice leviter irregulari et rotundato, bilobato, sinu 1.4-2.9 mm longo. *Stamina* 1-2.8 mm e basi corollae affixa; filamenta 2.4-4 mm longa; antherae 0.7-1.5 mm longae, appendice 0.3-1 mm longa. *Pistillum* 5-8 mm longum; ovarium 0.3-1.3 mm longum, glandibus distaliter; stylus 5-7 mm longus; lobis stigmatis 0.3-0.7 mm longis. *Calyx fructus* auctus. *Mericarpia* 1-2.5 mm longa, glandibus distaliter.

Typus: *Weber* 4752, 17.ix.1975, c. 30 km NW of Leonora, Western Australia (holo: MEL 671076; iso: AD 97549211, CANB, K, MEL 671075, MO, NSW, PERTH).

Erect shrub, c. 0.5-3 m high. *Branches* terete to subquadrangular, densely hairy [112.5-208 hairs/mm^2], appearing silvery grey-green; hairs ± straight, appressed, antrorse, 0.2-0.5 mm long, white or grey; glands absent. *Leaves* silvery grey-green, densely hairy [(58-)95-225 hairs/mm^2]; hairs ± straight, appressed, antrorse, 0.2-0.5 mm long, white or grey; glands absent; *petiole* absent or up to 0.4 mm long; *lamina* narrowly obovate to linear, rarely obovate, 7.3-36(-43) × 1.2-2.5(-3.4) mm; base attenuate; margin entire; apex obtuse, rarely subrounded; venation (including midrib) not visible. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic, sometimes with 1 or 2 accessory buds; 4-20-flowered [per conflorescence]. *Pedicel* 0.9-3.3(-4.2) mm long, densely hairy [142-258 hairs/mm^2], hairs 0.2-0.4 mm long, glands absent; *prophylls* narrowly oblong to linear, 0.7-3.6 mm long, 0.1-0.4 mm wide [length to width ratio 4-14, length of maximum width from base to total lamina length ratio 0], densely hairy [as for pedicel], not contracted at base, margin entire, apex obtuse. *Calyx* green to cream-coloured with maroon tinge; *tube* 1.8-4 mm long, outer surface moderately to densely hairy [36.7-179.2 hairs/mm^2], glands absent; inner surface glabrous or sparsely hairy in mouth; *abaxial lobe* depressed to very broadly ovate, (1.2-)1.8-2.9 mm long, 2-4 mm wide [length to width ratio 0.6-1.1], apex rounded, often slightly undulate, outer surface moderately to densely hairy [67-187.5 hairs/mm^2], glands absent, inner surface moderately to densely hairy [c. 35-187 hairs/mm^2]; *adaxial lobe* very broadly ovate to ovate, sometimes subdepressed ovate, (2-)3.4-5.6 mm long, 2.6-6.5 mm wide [length to width ratio 0.6-1.8], apex obtuse to rounded, outer surface sparsely to densely hairy [(8-)15-181 hairs/mm^2], glands absent, inner surface moderately to densely hairy [c. 30-100 hairs/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1.2-5]. *Corolla* 6.5-9(-10) mm long, white to cream-coloured, or very pale yellow-green, with mauve or purple (to pink) striations on inner surface of tube and/or mouth and base of lobes, inner surface of *abaxial*

median lobe often with 2 yellow spots; inner surface sparsely to moderately hairy [18-60 hairs/mm^2], hairs weak and usually slightly tangled, 0.4-0.5 mm long; *tube* 3.4-6.5 mm long, diameter at mouth 3.4-5.5 mm; *abaxial median lobe* spathulate or very broadly obovate to subobovate, 3.3-6.6 mm long, 2.7-5.5 mm wide [length to width ratio 1-1.8], apex irregular and rounded; *lateral lobes* very broadly obovate or subcircular to obovate, oblong, very broadly ovate to ovate, or broadly elliptic, 2.2-5.1(-6) mm long, 1.5-3.6 mm wide [length to width ratio 0.9-2.3], apex obtuse to rounded and often slightly irregular; *adaxial median lobe-pair* depressed to very broadly obovate, 2.6-5(-6) mm long, 4-7.3(-7.8) mm wide [length to width ratio 0.3-1], apex slightly irregular and rounded, deeply bi-lobed (sinus 1.4-2.9 mm long). *Stamens* inserted 1-2.8 mm above base of corolla; filaments 2.4-4 mm long, glabrous; anthers 0.7-1.5 mm long, connective extended to form a basal appendage 0.3-1 mm long. *Disc* c. 0.4-0.8 mm high. *Pistil* 5-8 mm long; *ovary* ± cylindrical to cupiform or obovoid, 0.3-1.3 mm long, diameter at base 0.7-1 mm, lobes 0.1-0.2 mm long, sparsely to densely glandular distally; *style* 5-7 mm long; *stigma lobes* 0.3-0.7 mm long. *Fruiting calyx* enlarged (abaxial lobe 5-16 mm long, 4-15 mm wide [length to width ratio 1-2.2]; adaxial lobe 2-5.5 mm long, 2.7-6.5 mm wide [length to width ratio 0.6-1.3]; [adaxial lobe length to abaxial lobe length ratio 0.3-0.5]. *Mericarps* 1-2.5 mm long, distally 0.4-0.8 mm extended beyond base of style, distal diameter (1.8-)2-2.4 mm, moderately to densely glandular [33-80 glands/mm^2]; seeds cylindrical-ellipsoid, c. 1.3-1.5 mm long, 0.6-0.8 mm wide.

Selected specimens examined. (Refer under subspecies).

Distribution. Occurs in the Northern Territory, South Australia and Western Australia. Figure 11.

Ecology. (Refer under subspecies).

Notes. This species has been frequently confused with *Prostanthera wilkieana*. *P. wilkieana* differs from this species by having longer more or less patent hairs (up to 2.1 mm long) which vary from antrorse to retrorse, longer prophylls (1.1-4.6 mm long cf. 0.7-1.6 mm long for *P. althoferi*), and a shorter pistil (2.2-5 mm long cf. 7-8 mm long for *P. althoferi*).

Conservation status. Does not appear to be threatened or endangered.

Etymology. This species honours the naturalist G.W. Althofer whose contribution to the cultivation of Australian plants and, in particular, his profound admiration of the genus *Prostanthera*, has significantly increased public awareness of the Australian flora.

Key to Subspecies

1a. Lamina 7.3-16 mm long [length to width ratio (2.5-)3.2-9.1]; anthers not cristate dorsally; inner surface of calyx with an occasional gland ..... 9.1 ssp. *althoferi*

1b. Lamina (17-)20-36(-41.5) mm long [length to width ratio 9.2-60(-83)]; anthers cristate dorsally (at least some anthers in each flower); inner surface of calyx moderately glandular..... 9.2 ssp. *longifolia*

9.1 ssp. **althoferi**

Shrub c. 0.5-1.3 m high. *Leaf lamina* narrowly obovate, rarely obovate, 7.3-16 × 1.2-2.5 mm [length to width ratio (2.5-) 3.2-9.1, length of maximum width from base to total lamina length ratio 0.6-0.8]. *Prophylls* inserted on distal half of pedicel [a_1 axis to anthopodium ratio 1.3-3.3]. *Calyx* pale green to cream-coloured (*George* 8093); *tube* (2.5-)3-4 mm long; inner surface very sparsely to moderately glandular [up to c. 50 glands/mm^2]; *abaxial lobe* 1.8-2.6 mm long, 2.6-3.4 mm wide, inner surface moderately hairy [c. 35-45 hairs/mm^2], very sparsely to moderately glandular [up to c. 50 glands/mm^2]; *adaxial lobe* 4.5-5.6 mm long, 2.6-6 mm wide [length to width ratio 0.8-1.8], outer surface moderately to densely hairy [36-80 hairs/mm^2], inner surface very sparsely glandular [up to c. 3 glands/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1.6-2.5]. *Corolla* with outer surface glabrous, sometimes sparsely hairy distally [up to c. 30 hairs/mm^2],

glands absent; *tube* 5.2-6.5 mm long; *abaxial median lobe* subobovate to spathulate, 4.3-6.6 mm long, 2.7-4 mm wide [length to width ratio 1.1-1.8]. *Stamens* with anthers not cristate dorsally; appendage tapering into a single narrowly triangular trichome (often with 1-3 smaller trichomes laterally). *Ovary* lobes sparsely to moderately glandular distally. Figure 4b.

Selected specimens examined (55 examined). WESTERN AUSTRALIA: Eremaean (Austin): *Aplin* 4552, 26.viii.1963, 22 miles N of Paynes Find (PERTH); *Broadbent* 1722, 12.x.1953, 12 miles W of Sandstone (F); *Conn* 1928-1931, 3.ix.1985, 15 km S of Menzies (MEL); *Conn* 2032, 8.ix.1985, 3.1 km E of road to Gabyon Homestead on Geraldton to Mt Magnet road (AD, KUN, MEL, MO, PERTH); *George* 4359, 7.ii.1963, Mt Morgan (PERTH); *Jutson* 275, -.xii.1916, Comet Vale (NSW); *Weber* 4767, 4768, 19.x.1975, c. 2 km [?] of Leonora (AD, MEL); (Coolgardie): *Bale* 124, -.ix.1965, Mt Hunt (PERTH); *Eichler* 20027, 30.x.1968, c. 10 km WSW of Kalgoorlie (AD, MEL, PERTH); *Gardner* 12215, 16.x.1959, Koolyanobbing Range (PERTH); *Russell* s.n., anno 1896, between Dundas & Diamond Rocks (MEL 1512041); (Helms): *George* 8093, 28.ix.1966, 21 miles NE of Laverton (KP, MO, PERTH). - South-West (Avon): *Maiden* s.n., -.x.1909, Pindar (NSW).

Distribution. Endemic to the Eremaean Botanical Province (Austin, Coolgardie & western Helms Districts) and South-West Botanical Province (northern Avon District) of Western Australia. Figure 11.

Ecology. Occurs on red sandy soils, often associated with rocky areas (granitic outcrops and granite breakaways) and lateritic soils, with *Acacia aneura*, *Allocasuarina* spp., *Dodonaea* spp., *Eremophila* spp., *Eucalyptus pyriformis*, *Hemigenia* sp., and spinifex (*Triodia* spp.).

9.2 ssp. **longifolia** Conn, ssp. nov. (Figure 4c)

P. striatiflora F. Muell. var. *sericea* Benth., Fl. Austral. 5: 104 (1870)(as 'Var. ?*sericea*'); Althofer, Cradle of Incense 92 (1978). *Lectotype* (here chosen): *Sullivan* s.n., s. dat., 'Gawler Ranges', South Australia (MEL 43794).

P. baxteri var. *crassifolia* auct. non Benth. (1870): J.M. Black, Fl. S. Austral. 3: 737 (1926); op. cit. 2nd edn 4: 737 (1965); Althofer, Cradle of Incense 154(p.p.), 158(p.p.), 162(p.p.) (1978); Haegi, in J. Jessop (ed.), Fl. Central Austral. 310(p.p. - included under *P. wilkieana*) (1981).

P. sp. *B*: Conn, in J. Jessop & H. Toelken (eds). Fl. S. Austral. 3: 1218 & 1219 (1986).

Frutices 1-3 m alti. *Lamina foli* anguste obovata usque linearis, (14.8-)17-36(-43) mm longa, 0.4-2.2(-2.5) mm lata. *Prophylla* plerumque circa ad medium pedicello affixa. *Calyx* probabiliter viridis; *tubus* 1.8-3 mm longus, interius glandibus moderatis vestita; *lobus abaxialis* (1.3-)2-2.9 mm longus, 2.1-4 mm latus, interius pilis moderatis usque densis vestita, glandibus moderatis vestita; *lobus adaxialis* (2.1-)3.4-5.4 mm longus, 3.4-6.5 mm latus, extra pilis sparsis usque densis vestita, glandibus moderatis vestita. *Corolla* extra basaliter glabra et distaliter pilis sparsis usque densis vestita, glandibus sparsis vestita; *tubus* 3.4-6.5 mm longus; *lobus abaxiali-medianus* spathulatus vel latissime obovatus usque late obovatus, 3.3-5.5 mm longus, 2.7-5.5 mm latus. *Stamina antheris* dorsaliter cristatis, appendice distaliter 1 usque circa 3 anguste triangularibus trichomatibus. *Ovarium lobis* distaliter glandibus moderatis usque densis vestita.

Typus: *Chinnock* 2641, 28.ix.1975, 33 km W of Wynbring, South Australia (holo: MEL 1552680; iso: AD 97544117, MEL 1552681, NSW, PERTH).

Shrub 1-3 m high. *Leaf lamina* narrowly obovate to linear, (14.8-)17-36(-43) × 0.4-2.2(-2.5) mm [length to width ratio 9.2-20(-23), length of maximum width from base to total lamina length ratio 0.5-0.9]. *Prophylls* with a variable insertion point on pedicel, usually inserted approximately halfway up pedicel [a_1 axis to anthopodium ratio (0.3-)0.8-1.7(-3.3)]. *Calyx* ? green; *tube* 1.8-3 mm long; inner surface moderately glandular [c. 60-70 glands/mm^2]; *abaxial lobe* (1.3-)2-2.9 mm long, 2.1-4 mm wide, inner surface moderately to densely hairy [c. 50-100 hairs/mm^2], moderately glandular [c. 60-70 glands/

mm^2]; *adaxial lobe* (2.1-)3.4-5.4 mm long, 3.4-6.5 mm wide [length to width ratio 0.6-1.2], outer surface sparsely to densely hairy [(8-)15-181 hairs/mm^2], inner surface moderately glandular [c. 60-70 glands/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1.2-5]. *Corolla* with outer surface glabrous basally, sparsely to densely hairy distally [65-100 hairs/mm^2], sparsely glandular [up to c. 17 glands/mm^2]; *tube* 3.4-6.5 mm long; *abaxial median lobe* spathulate or very broadly to broadly obovate, 3.5-5.5 mm long, 2.7-5 mm wide [length to width ratio 1-1.3]. *Stamens* with anthers cristate dorsally; appendage terminating in 1- c. 3 narrowly triangular trichomes. *Ovary lobes* moderately to densely glandular distally.

Selected specimens examined (50 examined). NORTHERN TERRITORY: Central South: *Beauglehole* 20477, 10.x.1966, Reedy Rock Hole, George Gill Range (AD, MEL); *Beauglehole* 26754, 14.vii.1968, Penny Springs, George Gill Range (AD); *Chippendale* 6250, 24.vi.1959, Glen Edith (AD, BRI, MEL, NSW); *Latz* 276, 10.xii.1968, Kings Canyon (AD).

SOUTH AUSTRALIA: Northern Arid: Western Sandplains (Victoria Desert): *Perry* 5602, 28.i.1956, 18 miles S of Emu (AD, CANB); (Maralinga): *Turner* s.n., 13.xii.1959, c. 6 km N of Nawa (AD); (Giles): *Lothian* 3851, 29.v.1967, c. 55 km W of Tallaringa Well (AD); (Oolarinna): *S.A. Pastoral Board* s.n., 16.ix.1953, Wallatinna (AD); (Illbillee): *Gilles* s.n., anno 1882, near Mt Everard (MEL). - Central Tablelands (Warrida): *S.A. Pastoral Board* s.n., 25.ix.1966, Commonwealth Hill (AD); (Breakaway): *Lazarides* 8250, 4.iv.1977, 8.5 km N of Lambina Homestead (AD); (Peake Creek): *Anon.*[*Helms*] s.n., 21.v.1891, Arckaringa Valley (NSW 128371 & 128372). - Western Pastoral: Gawler Uplands (Gawler): *Sullivan* s.n., s. dat., Gawler Ranges (MEL 43794); (Uno): *Mollenmans* 39, 8.iii.1981, Uno Homestead (AD). - Central Salt Lakes and Plateaux (Palthrubie): *Weber* 3266, 1.x.1972, Mt Sam (AD). - Kingoonya Plains and Dunes (Wallabyng): *Giles* s.n., anno 1880, Mt Eba (MEL 43897). - Great Victoria Desert (Ilkina): *Williams* 9138, 15.ii.1977, 17 km SE of Hiltaba Homestead (AD); (Yellabina): *Copley* 2671, 29.vii.1969, c. 3 km NNE of Ooldea (AD). - Eyre and Yorke Peninsulas: Northern Myall Plains (Lake Gilles): *Burkitt* s.n., s. dat., Lake Gilles (MEL 43797).

Distribution. Occurs in the Central South region of the Northern Territory, and the Northern Arid and Western Pastoral regions, plus Eyre Peninsula, of South Australia. Figure 11.

Ecology. Occurs in sandy soils, on sand plains, sand dunes or in interdunal areas, or on well-drained granitic loamy sands of stony hills, with *Acacia aneura*, *A. quadrimarginea*, *Aristida browniana*, *Eragrostis eriopoda*, *Eremophila* spp., *Triodia* sp. and *Thryptomene maisoneuvii*.

Notes. The diagnostic differences between this subspecies and ssp. *althoferi* are summarized in the 'Key to subspecies'. Refer to notes on the 'Incurved leaf' variant of *P. sericea* for comments on the relationship between this subspecies and that variant.

The three collections cited below (from Western Australia) have leaves which are very similar to those of ssp. *longifolia*.

Pritzel [*? Helms*] 843, -.x.1901, Coolgardie goldfields (AD, BR, E, GH, HBG, K, MEL, MO); *Weber* 5153, 16.x.1975, c. 65 km E or Morawa (AD, MEL, NSW); *Weber* 5186, 18.x.1975, c. 10 km E of Mouroubra Homestead (AD, MEL, NSW).

10. **Prostanthera behriana** Schldl., Linnaea 20: 610 (1847); Benth. in DC., Prod. 12: 700 (1848); Benth., Fl. Austral. 5: 102 (1870); Tate, Trans. & Proc. Roy. Soc. S. Austral. 3: 78 (1880); op. cit. 6: 145 (1883); op. cit. 8: 201 (1886); op. cit. 9: 279 (1887); op. cit. 12: 111 (1889); Handb. Fl. Extratrop. S. Austral. 151 & 252 (1890); J.M. Black, Fl. S. Austral. 3: 461 (1926); op. cit . 2nd edn, 4: 737 (1957); Lothian & Holliday, Growing Austral. Pl. 70 (1964); Althofer, Cradle of Incense 146, 150-153 (1978); Conn, in J. Jessop & H. Toelken (eds). Fl. S. Austral. 3: 1211 & 1212, fig. 555F (1986). *Type*: *Behr* s.n., -.xi.- [? 23.xi.1848, refer Kraehenbuehl (1981), p. 110], 'Im felsigen Querthale der Tonunda (Tanunda Creek), Sud-Australien', South Australia (holo: HAL).

Erect to straggling shrub, 1-2.5 m high. *Branches* ± terete, often laterally flattened and slightly grooved when young, densely hairy [c. 100-164 hairs/mm^2], sometimes hairs restricted to base of leaf and midrib of adaxial surface; hairs ± straight, appressed, antrorse, 0.3-0.4 mm long; glands absent. *Leaves* light to mid-green, sparsely to densely hairy [up to c. 100 hairs/mm^2], sometimes sparsely hairy adaxially, often glabrous abaxially; *petiole* absent; *lamina* obovate to narrowly ovate, (9.4-)14-26(-32) × 2-5(-6) mm [length to width ratio (4.2-)5-11, length of maximum width from base to total lamina length ratio 0.3-0.4], base attenuate to acute, margin entire and slightly incurved, apex subacute; venation (including midrib) indistinct. *Inflorescence* a frondose racemiform conflorescence, unifloresence monadic; 2-14-flowered [per conflorescence]. *Pedicel* 0.5-1 m long, densely hairy [c. 100-184 hairs/mm^2], hairs appressed, c. 0.5 mm long, glands absent; *prophylls* inserted on distal half of pedicel, often inserted near base of calyx [a_1 axis to anthopodium ratio 1-6.5], opposite, narrowly ovate to narrowly obovate, 3-6 mm long, 0.5-1 mm wide [length to width ratio 3-6, length of maximum width from base to total lamina length 0.4-0.7], densely hairy basally, distally sparsely hairy or glabrous, or with a few hairs at the base, base obtuse to acute, margin entire, apex subacute. *Calyx* light green, glands absent, outer surface moderately to densely hairy [c. 50-134 hairs/mm^2]; tube 2-3 mm long, inner surface glabrous; *abaxial lobe* depressed triangular, 1-1.4 mm long, 1.8-2.1 mm wide [length to width ratio 0.6-0.7], apex obtuse, sometimes slightly emarginate, inner surface glabrous at base, moderately to densely hairy distally [c. 60-80 hairs/mm^2]; *adaxial lobe* depressed to very broadly ovate, 2.1-2.7 mm long, 3-3.3 mm wide [length to width ratio 0.7-0.8], apex obtuse, inner surface glabrous at base, moderately to densely hairy distally [60-80 hairs/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1.5-2.1]. *Corolla* 15-20 mm long, white, pale blue, pale violet, purple-white, with purple streaks in throat, or more commonly with brown-red dots in throat and mouth of abaxial surface, venation purple; outer surface glabrous at base, moderately to densely hairy distally [67-118 hairs/mm^2], hairs c. 0.4 mm long, glands absent; inner surface glabrous at base, sparsely to moderately hairy distally, sometimes glabrous on distal parts of lobes [up to c. 60 hairs/mm^2], glands absent; *tube* 7-10 mm long, diameter at mouth c. 5 mm; *abaxial median lobe* ± spathulate, 6-10 mm long, 4.5-9 mm wide [length to width ratio 1.1-1.3], apex rounded and ± irregular, bilobed (sinus 0.5-1.5 mm long, 2-4 mm wide distally); *lateral lobes* ± oblong, ovate to obovate, 5.5-7 mm long, 2.5-3 mm wide [length to width ratio 2.2-2.3], apex rounded, sometimes slightly emarginate; *adaxial median lobe-pair* very broadly ovate, 4-6 mm long, 6-7 mm wide [length to width ratio 0.7-0.9], apex rounded, deeply bilobed (sinus 2.5-3 mm long). *Stamens* inserted 5.5-6 mm above base of corolla; filaments 1-5 mm long, cristate dorsally, lobes with small basal acumen c. 0.1 mm long, connective extended to form a basal appendage c. 1 mm long, terminating in c. 5 triangular trichomes. *Disc* c. 0.5 mm high. *Pistil* 7-9 mm long; *ovary* cylindrical-ovoid, c. 0.5 mm long, diameter at base 0.4-0.6 mm, lobes 0.1-0.2 mm long, with minute pedicellate glands distally; style 6.5-7 mm long; *stigma lobes* up to 0.4 mm long. *Fruiting calyx* enlarged (abaxial lobe 2.4-2.7 mm long, 2-2.2 mm wide [length to width ratio 1.1-1.3]; [adaxial lobe length to abaxial lobe length ratio 1.8-2.1]). *Mericarps* 2-3 mm long, distally c. 1 mm extended beyond base of style, distal diameter c. 2 mm, with pedicellate glands distally; seeds ± ovoid, c. 1.5-2 mm long, 0.8-1 mm wide. Figure 5.

Selected specimens examined (135 examined). SOUTH AUSTRALIA: South East: Frances Plateau (Bangham): *Roach* 63, 21.xi.1970, c. 32 km S of Keith, near Willalooka Store (AD). - Murray Mallee: South-east Mallee Heathlands (Moorlands): *Sharrad* 283, 26.x.1959, 5 miles S of Cooke Plains (AD); (Wellington): *Black* s.n., 24.x.1906, near Wellington (AD); (Angas Plains): *Hunt* 3038, 20.ix.1969, Milang (AD); Northern Calcarenite Ridges and Plains (Jacks Hill): *Spooner* 4175, 24.iv.1975, eastern end of Weerumbrook Hill Range (AD). - Mt Lofty Block: Mid-North Wheatlands (Mt Remarkable): *Burbidge* (& *Gray*) 4092, 14.ix.1955, Alligator Creek Gorge (AD, CANB, MEL, NSW, PERTH); (Burra Hill): *Chinnock* 1317, 1318, 31.ix.1973, Black Springs Reserve (AD); Peninsula Uplands (Barossa): *Carrick* 2968, 26.x.1971, Bethany (AD); (Para): *Whibley* 3814, c. 5 km E of Tanunda (AD); (Mt Terrible): *Schodde* 1031,

Figure 5. *Prostanthera behriana*. a - Twig and flowers. b - Open corolla. c - Calyx showing developing fruit. d - Stamens, ventral and dorsal views. (*Carrick* 2968).

25.xii.1958, Morialta Gorge (AD, CANB); (Sandergrove): *Conn* 689-691, 13.x.1979, Braendler's Scrub, Monarto South (AD, MEL); (Clarendon): *Tepper* s.n., anno 1881, Clarendon (MEL); (Aldinga): *Whibley* 5825, 20.xii.1976, MacLaren Flat (AD).

Distribution. Endemic to South Australia. It occurs from the lower Flinders Ranges, throughout the Lofty Ranges [Mt Lofty Block (excluding Kangaroo Island)] to south of Keith [Murray Mallee (excluding Upper Murray Lands) and South East (Frances Plateau)]. Figure 14.

Ecology. Commonly associated with *Astroloma conostephioides, Baeckea, Brachycome, Correa, Hibbertia, Leptospermum* and *Styphelia* heathlands in sandy soils (particularly between sand ridges), podsolized sands and gravel. Also found with *Eucalyptus baxteri, E. fasciculosa, E. leucoxylon, E. obliqua, Acacia pycnantha, Banksia marginata* and *Allocasuarina verticillata* woodland in loamy soils of granitic-gneiss rocky gullies.

Notes. Once recorded for Kangaroo Island [*S.A. White* s.n., -.x.1906, Middle River (AD)]; however, the locality given for this collection appears to be incorrect.

This species has its closest affinities with *P. ammophila*. Refer 'Notes' for *P. ammophila* for discussion of differences between these two taxa.

Conservation status. Not considered to be endangered.

Common name. Behr's Mint Bush (Guilfoyle 1910, p. 302).

11. **Prostanthera ammophila** Conn, sp. nov. (Figure 6a-c)

P. sp. *A* : Conn, in J. Jessop & H. Toelken (eds). Fl. S. Austral. 3: 1218 (1986).

Species nova Sectionis *Prostantherae. Frutices* 0.6-1.7 m alti. *Rami* et ramuli teretes usque subangulares, pilis densis vestita, argenteo-virides, pilis 0.5-0.7 mm longis, glandibus absentibus. *Folia* pilis densis vestita; *petiolus* absens; *lamina* ovata usque anguste elliptica, 7.2-13.3 mm longa, 2.5-5.5 mm lata, basi obtusa, margine integro et leviter incurvo, apice obtuso usque subacuto, interdum mucronato. *Pedicellus florum* 1-2.1 mm longus, pilis densis vestita, pilis 0.5-0.7 mm longis; *prophyllis* in dimidio distali pedicello affixis, anguste ovatis, anguste ellipticis usque linearibus, 3.8-8.1 mm longis, 0.4-1.1 mm latis. *Calyx* viridis cum purpureus usque malvinus suffusus; *tubus* 2.4-3.9 mm longus, extra pilis densis vestita, glandibus absentibus, interius glaber; *lobus abaxialis* depresse ovatus usque late ovatus, 1.9-3.5(-4.1) mm longus, (2.2-)2.5-3.7 mm latus, apice obtuso usque rotundato, saepe retuso, sinu usque ad circa 0.3 mm longo, extra pilis densis vestita, glandibus absentibus, interius pilis moderatis vestita; *lobus adaxialis* latissime ovatus, raro anguste ovatus, (3.4-)4-8.1 mm longus, (2.3-)4-7.4 mm latus, apice obtuso usque rotundato, extra pilis moderatis usque densis vestita, glandibus absentibus, interius pilis moderatis usque densis vestita. *Corolla* 13-15 mm longa, basaliter alba, alibi purpurea usque malvina, interdum rosea vel caerulea, cum lutea maculae in interius paginae abaxialis, extra pilis moderatis vestita, interius pilis sparsis vestita, glandibus absentibus; *tubus* 7-8.7 mm longus; *lobus abaxiali-medianus* spathulatus, 3-7 mm longus, 2.4-5.2 mm latus, apice obtuso, *lobis lateralibus* latissime ovatis usque ovatis vel oblongibus, 2.5-6 mm longis, 2.2-4.2 mm latis, apice obtuso, *pari loborum adaxiali-mediano* depresse ovato usque latissime ovato vel transverse late elliptico, 3-5.6 mm longo, 4.6-8.4 mm lato, apice irregulari et rotundato, bilobato, sinu 1.1-2.7 mm longo. *Stamina* 3.2-4.5 mm e basi corollae affixa; filamenta 2.5-4 mm longa; antherae 0.8-1.1 mm longae, appendice 0.6-1.6 mm longa. *Pistillum* 8-8.7 mm longum; ovarium circa 0.6 mm longum, glandibus distaliter; stylus 7.2-7.6 mm longus; lobis stigmatis 0.6-0.7 mm longis. *Calyx fructus* auctus. *Mericarpia* 2.5-3 mm longa, glandibus distaliter.

Typus: *Donner* 3388, 3.x.1969, c. 70 km SW of Yardea Homestead, South Australia (holo: MEL 665261; iso: AD, MEL 665260, NSW).

Erect to spreading shrub, 0.6-1.7 m high. *Branches* terete to subangular, densely hairy [112-204 hairs/mm^2], appearing silver-green; hairs ± straight to curled, subpatent to appressed, antrorse, 0.5-0.7 mm long, white; glands absent. *Leaves* silver-green to light green, abaxial surface paler than adaxial surface, densely hairy [129-204 hairs/mm^2], hairs [as for branches], glands absent; *petiole* absent; *lamina* ovate to narrowly ellptic, 7.2-13.3 × 2.5-5.5 mm [length to width ratio 2.1-3.7, length of maximum width from base to total lamina length ratio 0.3-0.6], base obtuse, margin entire and slightly incurved, apex obtuse to subacute, sometimes with a small blunt mucro; venation (including midrib) not visible. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; c. 6-12-flowered [per conflorescence]. *Pedicel* 1-2.1 mm long, densely hairy [133-208 hairs/mm^2], hairs 0.5-0.7 mm long, glands absent; *prophylls* inserted on distal half of pedicel [a, axis to anthopodium ratio 1-3], opposite, narrowly ovate, narrowly elliptic to linear, 3.8-8.1 mm long, 0.4-1.1 mm wide [length to width ratio 5.1-18.1, length of maximum width from base to total lamina length ratio 0.3-0.5], densely hairy [as for leaves], base acute to subattenuate, margin entire, apex subattenuate. *Calyx* green with purple to mauve tinge; tube 2.4-3.9 mm long, outer surface densely hairy [(108-)141-196 hairs/mm^2], glands absent, inner surface glabrous; *abaxial lobe* depressed ovate to broadly ovate, 1.9-3.5(-4.1) mm long, (2.2-)2.5-3.7 mm wide [length to width ratio (0.4-)0.6-1.2], apex obtuse to rounded, often retuse (sinus up to c. 0.3 mm long), outer surface densely hairy [95-175 hairs/mm^2], glands absent, inner surface moderately hairy [c. 55 hairs/mm^2]; *adaxial lobe* very broadly ovate to ovate (rarely narrowly ovate), (3.4-)4-8.1 mm long, (2.3-)4-7.4 mm wide [length to width ratio 0.7-2(-2.7)], apex obtuse to rounded, outer surface moderately to densely hairy [(54-)80-121 hairs/mm^2], glands absent, inner surface moderately to densely hairy [61-120 hairs/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1.6-2.5]. *Corolla* 13-15 mm long, basal part of tube white, distally purple to mauve (sometimes predominately pink or blue), with yellow spots on inner abaxial surface of throat and base of abaxial median lobe, outer surface moderately hairy [c. 45 hairs/mm^2], inner surface sparsely hairy [c. 15 hairs/mm^2], glands absent; *tube* 7-8.7 mm long, diameter at mouth 4-5 mm; *abaxial median lobe* spathulate, 3-7 mm long, 2.4-5.2 mm wide [length to width ratio 0.8-1.8], apex slightly irregular and rounded; *lateral lobes* very broadly ovate to ovate or oblong, 2.5-6 mm long, 2.2-4.2 mm wide [length to width ratio (0.8-)1-1.7], apex obtuse; *adaxial median lobe-pair* depressed ovate to very broadly ovate or transversely broad elliptic, 3-5.6 mm long, 4.6-8.4 mm wide [length to width ratio 0.5-0.7], apex irregular and rounded, bilobed (sinus 1.1-2.7 mm long). *Stamens* inserted 3.2-4.5 mm above base of corolla; filaments 2.5-4 mm long, glabrous; anthers 0.8-1.1 mm long, connective extended to form a basal appendage 0.6-1.6 mm long, terminating in 2 or 3 narrowly triangular trichomes. *Disc* c. 0.2 mm high. *Pistil* 8-8.7 mm long; *ovary* cylindrical-obovoid, c. 0.6 mm long, diameter at base c. 0.7 mm, lobes 0.1-0.2 mm long, sparsely to moderately glandular distally; *style* 7.2-7.6 mm long; *stigma lobes* 0.6-0.7 mm long. *Fruiting calyx* enlarged (abaxial lobe 5-10 mm long, 6-9.5 mm wide [length to width ratio 0.8-1.3]; adaxial lobe 2.5-5.5 mm long, 3-5 mm wide [length to width ratio (0.6-)0.9-1.3]; [adaxial lobe length to abaxial lobe length ratio 0.4-0.7]). *Mericarps* 2.5-3 mm long, distally 1-1.5 mm extended beyond base of style, distal diameter 2-2.2 mm, distal half moderately to densely glandular [45-100 glands/mm^2]; seeds ellipsoid-cylindrical, c. 1.5 mm long, c. 0.8 mm wide.

Selected specimens examined (25 examined). SOUTH AUSTRALIA: Western Pastoral: Gawler Uplands (Gawler - Thurlga Station): *Copley* 2745, 1.viii.1969 (AD); *Warnes* s.n., 1.ix.1968 (AD); (Yellabina): *S.A. Pastoral Board* s.n., 3.x.1966, c. 30 km N of Koonibba (AD); Eyre and Yorke Peninsulas (Eyre Peninsula): Central Mallee Plains and Dunes (Kimba): *Rohrlach* 936, 28.x.1961, c. 15 km WNW of Kimba (AD); (Corrabinnie): *Weber* 7040, 8.x.1981, c. 20 km S of Paney Homestead (AD); (Koongawa): *Chinnock* 2905, 19.x.1975, 15 km NNE of Wallala Hill (AD); (Wirrula - Penong): *Kaspiew* 77, 20.xi.[(post 1946] (S); *Kaspiew* 1125, 20.xi.-[post 1946] (BR); (Midgee): *Warnes* 8, 5.ix.1969, c. 48 km N of Cowell (AD); (Hambidge); *Kraehenbuehl* 2052, 8.x.1966, Hambidge Conservation Park (AD).

Distribution. Endemic to the Gawler Ranges (Gawler Uplands) and Eyre Peninsula (Central Mallee Plains and Dunes) of South Australia. Figure 12.

Ecology. Occurs on sand dunes in white sandy soil and in white sandy loam on rocky hills. It has been recorded as occurring with *Eucalyptus* spp.

Notes. This species has its closest affinities with *P. behriana* and to a lesser extent with *P. centralis*. It differs from *P. behriana* by having a smaller corolla (13-15 mm long cf. 15-20 mm long for *P. behriana*), an enlarged membranous fruiting calyx (the fruiting calyx remains more or less unchanged in *P. behriana*), and the hairs of the branches are longer (0.5-0.7 mm long cf. 0.3-0.4 mm long for *P. behriana*). *P. ammophila* differs from *P. centralis* by having the hairs of the branches and leaves more or less appressed and antrorse, whereas those of the latter species are more or less patent. Although there is considerable overlap in the range of leaf size for the two species, the leaves of *P. ammophila* tend to be smaller than those of *P. centralis*. *P. ammophila* has a style approximately 7.2-7.6 mm long (c. 8-10 mm long for *P. centralis*). The adaxial calyx lobe is shorter in *P. ammophila* (1.9-3.5(-4.1) mm long cf. 3.7-7 mm long in *P. centralis*).

Conservation status. Not known. However, it has been recorded as uncommon or rare by *Copley* 2745, *Kraehenbuehl* 2052, *Warnes* 153, and *Weber* 7020.

12. **Prostanthera centralis** Conn, sp. nov. (Figure 7b)

Species nova Sectionis *Prostantherae*. *Frutices* usque ad 1 m. alti. *Rami* et ramuli plus minusve teretes, dense hirsuti, pilis (0.1-)0.2-1.5 mm longis, glandibus hemisphaericis et interdum pedicellatus. *Folia* dense hirsuta; *petiolus* 0.5-1.5 mm longus; *lamina* ovata usque elliptica, 9-20(-27) mm longa, 4-9(-13) mm lata, basi rotundata usque subacuta, margine integro, apice minusve obtuso usque rotundato. *Pedicellus florum* 1.3-3.3 mm longus, dense plus minusve hirsutus, pilis circa 0.5 mm longis; *prophyllis* usque ad circa 1.5 mm e basi calycis affixis, anguste obovatis vel anguste ellipticis, 4-6 mm longis, 0.5-1 mm latis. *Calyx* prope basin viridis, alibi purpureo-viridis, extra pilis densis vestita et sparse usque moderate glandifer, interius pilis moderate vestita et sparse glandifer; *tubus* 2.5-5 mm longus; *lobus abaxialis* latissime ovato-circularis, 3-6 mm longus, 4-7 mm latus, apice rotundato; *lobus adaxialis* transverse ellipticus usque latissime ovato-subcircularis, 3.7-7 mm longus, 6-8(-11) mm latus, apice rotundato, leviter retuso. *Corolla* 11-16 mm longa, purpureo-caerulea usque caerulea, extra pilis sparsis usque densis vestita, interius pilis sparsissmis vestita; *tubus* 8-10.5 mm longus; *lobus abaxiali-medianus* latissime ovato-subcircularis usque latissime subangulari-ovatus, 3-5 mm longus, 5-6 mm latus, apice obtuso, *lobis lateralibus* latissime ovato-subcircularis usque late ovatis, (circa 2.5-)4 mm longis, (2-)3 mm latis, apice obtuso, *pari loborum adaxiali-mediano* depresse ovato, circa 4 mm longo, 8 mm lato, apice rotundato et profunde bilobato, sinu usque ad 3 mm longo. *Stamina* 3-4 mm e basi corolla affixa; filamenta 5-7 mm longa; antherae 1-1.4 mm longae, appendice 1.8-2.5 mm longa. *Pistillum* 9-11 mm longum; ovarium 0.8-1 mm longum; stylus circa 8-10 mm longus; lobis stigmatis 0.1-0.2 mm longis. *Calyx fructus* auctus. *Mericarpia* 2-2.5 mm longa.

Typus. *Chinnock* 510, 25.viii.1973, Dean Range, 6.5 km S of Docker River Settlement, Northern Territory (holo: MEL 641979; iso: AD).

Erect shrub or subshrub, up to 1 m high. *Branches* ± terete, densely hirsute [150-200 hairs/mm^2]; hairs simple, unicellular (multicellular hairs rarely present), ± straight, ± patent, (0.1-)0.2-1.5 mm long, translucent to white; glands mostly ± hemispherical [up to c. 12 glands/mm^2], some pedicellate glands usually present [15- c. 20 glands/mm^2], pedicellate glands 0.3-0.8 mm long. *Leaves* densely hirsute [160-195 hairs/mm^2]; hairs (0.1-)0.2-1.5 mm long; glands mostly + hemispherical [20-25 glands/mm^2], with occasional pedicellate glands present (particularly on petiole and lamina margin); *petiole* 0.5-1.5 mm long; *lamina* ovate to elliptic, 9-20(-27) × 4-9(-13) mm [length to width ratio (1.4-)1.6-2.2(-2.6), length of maximum width from base to total lamina length ratio 0.4-0.5], base rounded to subacute, margin entire, apex ± obtuse to rounded; venation faint to distinct, midrib raised on abaxial surface, veins slightly raised on abaxial surface, 2-4(-5) pairs. *Inflorescence* a frondose to frondo-subbracteose racemiform conflorescence, uniflorescence monadic; c. 16-46-flowered [per conflorescence]; distal leaves of conflorescence prophyll-like, basal ones similar to vegetative leaves, ±

Figure 6. a-c - *Prostanthera ammophila*. a - Twig and flowers. b - Calyx. c - Prophylls. (*Donner* 3388). d-f - *P. wilkieana*. d - Twig and flowers. e - Calyx. f - Prophylls. (*Brockway* s.n., 20.x.1947). g-i - *P. scutata*. g - Twig and flowers. h - Calyx. i - Prophylls. (*Gardner* 14266).

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subangular-obovate to elliptic, 6-9 × 2-4 mm, purplish, becoming light green from apex to base, basal leaves of conflorescence light green throughout, indumentum similar to that of the vegetative leaves. *Pedicel* 1.3-3.3 mm long, densely hairy, hairs c. 0.5 mm long; *prophylls* inserted at base of calyx or up to c. 1.5 mm from distal end of pedicel, hence overlapping base of calyx [a_1 axis to anthopodium ratio up to 2], narrowly obovate or narrowly elliptic, 4-6 × 0.5-1 mm [length to width ratio 6-8, length of maximum width from base to total lamina length ratio 0.5-0.7], densely hairy, hairs c. 0.5 mm long, base narrowly cuneate, margin entire, apex obtuse. *Calyx* green basally, purple-green distally; outer surface densely hairy [83-134 hairs/mm^2], hairs 0.2-0.4 mm long and 1.3-2 mm long, the longer hairs more abundant on basal half of calyx, sparsely to moderately glandular [3-20 glands/mm^2], glands ± hemispherical; inner surface moderately hairy [40-50 hairs/mm^2], hairs 0.3-0.7 mm long, mostly suberect; sparsely glandular [3-10 glands/mm^2], glands ± hemispherical; *tube* 2.5-5 mm long; *abaxial lobe* very broadly ovate-circular, 3-6 mm long, 4-7 mm wide [length to width ratio 0.7-1], apex rounded; *adaxial lobe* transversely elliptic to very broadly ovate-subcircular, 3.7-7 mm long, 6-8 (-11) mm wide [length to width ratio (0.5-)0.9-1.2], apex rounded, slightly retuse (sinus c. 0.1 mm long), [adaxial lobe length to abaxial lobe length ratio 1.2-1.7]. *Corolla* 11-16 mm long, purplish-blue, mauve to blue; outer surface distally sparsely to moderately hairy [28-38 hairs/mm^2], hairs 0.5-0.6 mm long; inner surface with a few scattered hairs [up to c. 10 hairs/mm^2], hairs 0.1-0.2 mm long; *tube* 8-10.5 mm long; *abaxial median lobe* very broad, ovate-subcircular to subangular-ovate, 3-5 mm long, 5-6 mm wide [length to width ratio 0.6-0.8], apex emarginate (sinus c. 0.8 mm long); *lateral lobes* very broadly ovate-subcircular to broadly ovate (c. 2.5-)4 mm long, (2-)3 mm wide [length to width ratio c. 1.3], apex obtuse; *adaxial median lobe-pair* depressed ovate, c. 3.3-4 mm long, 6-8 mm wide [length to width ratio c. 0.5], apex rounded, bilobed or deeply emarginate (sinus up to 3 mm long), each half of lobe-pair very broadly ovate [length to width ratio c. 1] and each with an obtuse apex. *Stamens* inserted 3-4 mm above base of corolla; filaments 5-7 mm long, glabrous (rarely with an occasional hair); anthers 1-1.4 mm long, base of lobes with minute acumen up to c . 0.1 mm long, connective cristate (triangular trichomes up to c . 0.3 mm long) and extended to form 1 or 2 basal appendages 1.8-2.5 mm long, distal end of appendages with 1- c. 6 triangular trichomes (trichomes up to c. 0.3 mm long). *Disc* c. 0.5 mm high. *Pistil* 9-11 mm long; *ovary* 0.8-1 mm long; *style* c. 8-10 mm long; *stigma lobes* 0.1-0.2 mm long. *Fruiting calyx* enlarged (abaxial lobe 6.5-7 mm long, 9.4-9.8 mm wide [length to width ratio 0.7]; adaxial lobe 8.5-9 mm long, 11-12 mm wide [length to width ratio 0.8]; [adaxial lobe length to abaxial lobe length ratio 1.3]. *Mericarps* 2-2.5 mm long, distally 1.5 mm extended beyond base of style; seeds ± ellipsoid, c. 1 mm long, c. 0.8 mm wide.

Specimens examined. NORTHERN TERRITORY: Central South: *Basedow* 133, 1.vii.1926, Mt Unapproachable (K); *Butler* 91, -.iv.1967, Armstrong River, Petermann Range (PERTH); *Carolin* 5299, 18.viii.1966, Mt Phillips, Petermann Range (SYD); *Chinnock* 510, 25.viii.1973, Dean Range, 6.5 km S of Docker River Settlement (AD, MEL); *Chinnock* 536, 23.viii.1973, 9.6 km E. of Wallera Ranch (AD); *Henshall* 2767, 9.x.1979, Mannanana Range, Docker River area (AD); *Latz* 879, 29.x.1970, Bloods Range, 26 km NE of Docker River Settlement (AD, MEL, NT, PERTH); *Latz* 1753, 23.ix.1971, c. 35 km NW of Mt Olga (NT); *Latz* 2386, 10.iv.1972, Bloods Range (AD); *Latz* 8024, 10.ix.1978, Mannanana Range (AD).

WESTERN AUSTRALIA: Eremaean: Giles: *Carolin* 6181, 2.viii.1967, Trig Point on Rawlinson Range (K, NSW); *George* 8277, 3.x.1966, c. 32 miles W of Giles, Rawlinson Range (MEL, PERTH); *George* 8293, 3.x.1966, Pass of the Abencerrages, Rawlinson Range (MEL, PERTH); *George* 8311, 4.x.1966, Walter James Range (MEL, PERTH); *George* 8812, 20.vii.1967, Glen Helen, Rawlinson Range (PERTH); *Finlayson* ex *Herb. J.M. Black* s.n., -.ii.1935, Robert Range (AD 97337163); *Hill* & *Lothian* 843, 7.vii.1958, c. 4 miles N of Giles (AD, MEL).

Distribution. Northern Territory (south-western Central South region) and Western Australia (Eremaean Botanical Province: Giles District). Figure 12.

Ecology. Occurs in gravelly soils on quartzite scree slopes with *Triodia pungens*, *T. spicata*, *Plectrachne melvillei*, *Eucalyptus oxymitra* and *Acacia* spp.

Notes. This species has its closest affinities with *P. ammophila*. The differences between the two species are discussed under *P. ammophila*.

Conservation status. This species has been recorded as rare or infrequent (*Latz* 879, 1753, 2386 & 8024, and *George* 8812). Risk Code = 3K.

13. **Prostanthera wilkieana** F. Muell., Fragm. 8: 230 (1874); Tate, Trans. & Proc. Roy. Soc. S. Austral. 3: 78 (1880); op. cit. 12: 111 (1889); Handb. Fl. Extratrop. Fl. S. Austral. 150 & 252 (1890); F. Muell. & Tate, Trans. & Proc. Roy. Soc. S. Austral. 13: 104 (1890); Tate, in P. Spencer, Rep. Horn Exped. 3: 173 (III. 1896); F. Muell. & Tate, Trans. & Proc. Roy. Soc. S. Austral. 16: 374 (1896); Diels & Pritzel, Bot. Jahrb. 35: 526, t. 59 (1904; J. M. Black, Fl. S. Austral. 3: 491 (1926); C. A. Gardner, Enum. Pl. Austral. Occid. 114 (1931); J. M. Black, Fl. S. Austral. 2nd edn 4: 737 (1957); Blackall & Grieve, W. Austral. Wildfl. 3: 592 (1965); J. S. Beard, Descr. Cat. W. Austral. Pl. 94 (s. dat. [Oct. 1965]); Galbraith, Wildfl. SE Austral. 325 (1977); Althofer, Cradle of Incense 154, 156, 157 & 161 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 452 (1981); Haegi, in J. Jessop (ed.), Fl. Central Austral. 310 (1981) (p.p., incl. *P. althoferi* ssp. *longifolia*); Conn, in J. Jessop & H. Toelken (eds). Fl. S. Austral. 3: 1217 & 1218 (1986). *Lectotype* (here chosen): *E. Giles* s.n., s. dat. [18.ix.1873-(?)22.xi.1873 (interpolated from diary of Giles 1875)], between Mt Olga and Barrow Range, Northern Territory (lecto: MEL 43805 - lower right specimen; isolecto: MEL 43805 - upper left and centre specimens, MEL 43806).

Erect, densely branched shrub, 0.3-1.2 m high. *Branches* ± terete, densely hairy [91-200(-283) hairs/mm^2], appearing silvery, silver-green or grey-green; hairs curled to almost straight, subappressed (especially the shorter hairs) to almost patent, antrorse to retrorse (indumentum appearing scruffy), 0.2-2.1 mm long (short and long hairs usually present on the same branch), white; glands absent. *Leaves* silvery, silver-green or grey-green, densely hairy, rarely moderately hairy [(58-)91-235 hairs/mm^2], hairs [as for branches], glands absent; *petiole* absent; *lamina* elliptic, obovate to narrowly elliptic, narrowly obovate or ± narrowly oblong, (2.8-)4-10(-16) × 1.3-5.4 mm [length to width ratio 1.5-4.7, length of maximum width from base to total lamina length ratio 0.4-0.8], base attenuate, margin entire and often slightly incurved, apex obtuse or sometimes rounded; venation not visible, midrib sometimes faint (on abaxial surface). *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 8-14-flowered [per conflorescence]. *Pedicel* 1.1-3.3 mm long, densely hairy [117-274 hairs/mm^2], hairs 0.2-1.8 mm long, glands absent; *prophylls* inserted on distal half of pedicel [a_1 axis to anthopodium ratio 1.4-5], opposite, narrowly obovate to linear, 1.1-4.6 mm long, 0.2-0.5(-0.9) mm wide [length to width ratio (2.9-)3.7-7(-9.7), length of maximum width from base to total lamina length ratio 0.3-0.8], densely hairy [as for leaves], base attenuate, margin entire and often incurved, apex obtuse to subattenuate. *Calyx* silvery-green; *tube* 2.6-4.3 mm long, outer surface densely hairy [116-241 hairs/mm^2], glands absent, inner surface glabrous, rarely sparsely glandular; *abaxial lobe* depressed-ovate to broadly ovate, or depressed angular-ovate to broadly angular-ovate, (2.2-)3.6-6.5 mm long, (3.9-)4.2-7.5 mm wide [length to width ratio 0.6-1.1], margin entire or ± trilobed distally, apex obtuse, outer surface densely hairy [(115-)120-231 hairs/mm^2], glands absent, inner surface densely hairy [121-228 hairs/mm^2]; *adaxial lobe* depressed ovate to very broadly ovate, (1.3-)2.2-3.6(-4.3) mm long, 2.1-4(-5.2) mm wide [length to width ratio 0.6-0.9], apex obtuse to rounded, outer surface densely hairy [(115-)123-222 hairs/mm^2], glands absent, inner surface densely hairy [114-220 hairs/mm^2]; [adaxial lobe length to abaxial lobe length ratio 0.4-0.6(-0.9)]. *Corolla* 7.5-17 mm long, mauve to pale violet or white (sometimes pale blue), with deep purple streaks in throat and a few dull yellow to yellow-brown spots on inner surface of abaxial median lobe, outer surface sparsely hairy [10-23 hairs/mm^2], inner surface sparsely hairy [25-42 hairs/mm^2], lobes usually more densely hairy than tube, glands absent; *tube* 3.3-7.5(-10.4) mm long,

diameter at mouth 4-5.5 mm; *abaxial median lobe* ± spathulate, (2.1-)3-6(-7.8) mm long, (1.7-)3-6.4(-7.8) mm wide [length to width ratio 0.9-1.6], apex irregular and bilobed (sinus 1-c. 3 mm long); *lateral lobes* broadly ovate to ovate or oblong, often broadly angular-obovate, 2-5.2 mm long, 1.3-4.7 mm wide [length to width ratio 1.2-2.6], apex obtuse; *adaxial median lobe-pair* depressed obovate, depressed ovate to broadly elliptic or broadly obovate, (1.8-)2.9-6.6 mm long, (2.7-)3.5-5.6(-9) mm wide [length to width ratio 0.5-1.3], apex rounded to sometimes obtuse, often slightly irregular, bilobed (sinus 0.7-1.4 mm long). *Stamens* inserted (1.6-)2.7-4(-4.5) mm above base of corolla; filaments 2-3.3 mm long, glabrous; anthers 0.9-2.2 mm long, connective extended to form a basal appendage (0.2-)0.4-1.3 mm long, terminating in 1-3 narrowly triangular trichomes. *Disc* up to 0.6 mm high. *Pistil* 2.2-5 mm long; *ovary* ± spherical to ± cylindrical, 0.4-0.5 mm long, diameter at base 0.6-1 mm, lobes up to c. 0.2 mm long, glabrous, often very sparsely glandular distally; *style* 2.5-6 mm long, glabrous, rarely with a few scattered glands; *stigma lobes* 0.3-0.8 mm long. *Fruiting calyx* enlarged (abaxial lobe 2.6-5.9 mm long, 3.5-6.5 mm wide [length to width ratio 0.6-1]; adaxial lobe 6.2-11.8 mm long, 6.9-11.8 mm wide [length to width ratio 0.9-1.2]; [adaxial lobe length to abaxial lobe length ratio 1.4-2.5]). *Mericarps* 1.5-2 mm long, distally 0.2-0.3 mm extended beyond base of style, distal diameter 2.2-2.4 mm, distally sparsely to moderately glandular [up to c. 80 glands/mm²]; seeds ellipsoid-cylindrical, c. 1.5 mm long, c. 0.6 mm wide. Figure 6d-f.

Selected specimens examined (42 examined). NORTHERN TERRITORY: Central South: *Latz* 2340, 8.iv.1972, W of Lake Hopkins (AD); *Latz* 5725, 22.ix.1974, SW of Mt Olga (AD, MEL).

SOUTH AUSTRALIA: Northern Arid: Western Sandplains (Mt Sir Thomas): *Helms* s.n., 7.vii.1891, Camps 15 & 16, near Mt Watson (AD); *Helms* s.n., 30.vi.1891, Camp 12, 80 km WNW of Mt Lindsay (AD, K, MEL, NSW); *Helms* s.n., s. dat. [-.vi-vii.1891 (interpolated from Lindsay 1893)], Camps 11 & 15, near Mt Watson (AD 96909002); (Okaraluga): *S.A. Pastoral Board* s.n ., 25.ix.1955, Mt Moulden (AD).

WESTERN AUSTRALIA: Eremaean (Carnegie): *Burbidge* 1236, 6.x.1960, 24 miles NE of Mt Charles (CANB); *Chinnock* 791, 5.ix.1973, 8 km NE of Paddy's Bore, Yelma Station (AD, MEL, NSW, PERTH); *George* 8163, 68 miles SW of Warburton Mission (AD, KP, MO, PERTH); (Helms): *George* 8385, 10.x.1966, 1 mile W of Neale Junction (PERTH); (Keartland): *De Graff* 110, 27.i.1969, Pierre Springs (PERTH); (Fortescue): *Lullfitz & Fairall* L2566 , 12.x.1963, 640 miles [from Perth], N of Meekatharra (KP); (Ashburton): *Bennett* 99, -.vii.1941, Princess Ranges (PERTH); (Austin): *Aplin* 2464, 23.viii.1963, 8 km E of Meekatharra (BRI, PERTH); *Conn* 2077a, 11.ix.1985, c. 10 km NW of the Mullewa to Gascoyne Junction road on road to Woodleigh Station (CANB, MEL, MO, PERTH); *Conn* 2103, 12.ix.1985, c. 23 km W of the Mullewa to Gascoyne Junction road on road to Woodleigh Station (KUN, MEL, MO, PERTH).

Distribution. Occurs in the Central South region of the Northern Territory, the Northern Arid (Western Sandplains) of South Australia, and the Eremaean Botanical Province (Ashburton, Austin, Carnegie, Fortescue & Helms Districts) of Western Australia. Figure 13.

Ecology. Occurs in spinifex sandplain communities, in the interdunal area in red sand with *Acacia coriacea, A. ligulata, A. salicina, Eremophila platythamnos, Eucalyptus gongylocarpa* and *Triodia basedowii.* Also occurs near watercourses, often in *Plectrachne* spp. grasslands (*Burbidge* 1236, *George* 8163). Once recorded as occurring on lateritic stony rises (*Chinnock* 791).

Typification. The herbarium sheet MEL 43805 contains five specimens and one envelope of fragments. The herbarium label (in Mueller's hand) corresponds with the locality details in the protologue ('Inter montem Olgae et tractum Barrow's Range; E. Giles', Mueller 1874, p. 230). There is close agreement between the description provided in the protologue and the lower right specimen of this sheet which has well preserved flowers and fruits.

Notes. This species has close affinities with *P. ammophila* (S. Australia) and *P. scutata* (W. Australia). The indumentum of *P. ammophila* is made up of antrorse hairs which are mainly appressed, some subpatent hairs are present (hairs 0.5-0.7 mm long). The

hairs of *P. wilkieana* vary from subappressed to almost patent, and antrorse to retrorse, such that the indumentum appears scruffy (particularly on older branches). The subappressed hairs of this species are less than 0.5 mm long, whereas the subpatent to almost patent hairs are 1-2.1 mm long. In *P. ammophila* and *P. scutata* the hairs are all approximately the same length. The hairs of *P. scutata* are appressed to subpatent, antrorse to retrorse, 0.3-0.6 mm long, and much of the indumentum (particularly on the leaves) is made up of ± strongly curled hairs. In *P. wilkieana* and *P. ammophila* the hairs on the leaves are ± straight for most of their length.

The leaves are basally attenuate in *P. wilkieana*, but obtuse in *P. ammophila* and attenuate to acute in *P. scutata*. The prophylls of *P. wilkieana* tend to be shorter, with a smaller length to width ratio than those of *P. ammophila* (1.1-4.6 mm long [length to width ratio (2.9-)3.7-7(-9.7)] cf. *P. ammophila* 3.8-8.1 mm long [length to width ratio 5.1-18.1)]. The prophylls of *P. scutata* are similar to those of *P. wilkieana*.

The style length is also useful in distinguishing between these three species (*P. ammophila* — 2.5-6 mm long; *P. scutata* — 14.5-15.7 mm long; *P. wilkieana* — 7.2-7.6 mm long).

De Graaf 110 records that this species is eaten by kangaroos.

Conservation status. Not considered to be endangered.

Common name. One Aboriginal name (of unknown language group) for this species is 'Nyil-Nyil' (*de Graaf* 110).

14. **Prostanthera scutata** C.A. Gardner, J. Roy. Soc. W. Austral. 47: 63 (1964); Blackall & Grieve, W. Austral. Wildfl. 3: 593 (1965); J.S. Beard. Descr. Cat. W. Austral. Pl. 94 (s. dat. [Oct. 1965]); Althofer, Cradle of Incense 154 & 159 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 452 (1981). *Type*: *Gardner* 14266, 19.xii.1962, 'ad fontem flumen Hutt' (holo: PERTH).

Erect compact shrub, 0.2-0.3 m high. *Branches* terete, densely hairy [141-233 hairs/mm^2], appearing dull grey-green; hairs slender, weak, ± straight to loosely curled (particularly on distal 1-3 internodes), loosely appressed to subpatent, antrorse to retrorse, 0.3-0.6 mm long, white; sparsely glandular [4-13 glands/mm^2] or glands absent. *Leaves* grey-green, moderately to densely hairy, hairs ± tightly curled, sparsely glandular [4-31 glands/mm^2] or rarely with glands absent; *petiole* 0.3-1.8(-2.4) mm long, densely hairy [137-275 hairs/mm^2], sparsely glandular [4.2-16.7 glands/mm^2] or glands absent; *lamina* broadly elliptic (almost subcircular) to narrowly elliptic, sometimes narrowly obovate, 1.6-11.1 x 1.1-6.8 mm [length to width ratio 1.1-3, length of maximum width from base to total lamina length ratio 0.4-0.7]; [petiole length to lamina length ratio 0.07-0.4], moderately to densely hairy [66-164 hairs/mm^2], sparsely glandular [3-27 glands/mm^2] or glands absent, base attenuate (sometimes abruptly so) to acute, margin entire, apex obtuse to rounded; venation not visible, midrib sometimes faint on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 6- c . 20-flowered [per conflorescence]. *Pedicel* 1.3-2.6 mm long, densely hairy [166.7-292 hairs/mm^2]; hairs c. 0.4 mm long; sparsely glandular [4.2-16.7 glands/mm^2] or glands absent; *prophylls* inserted on distal half of pedicel [a_1 axis to anthopodium ratio 1.1-7.7], opposite, narrowly obovate to linear, 1.3-4.2 mm long, 0.2-0.7 mm wide [length to width ratio 6.2-12.4, length of maximum width from base to total lamina length ratio 0.6-0.7], densely hairy [as for leaves], base attenuate, margin entire and often slightly incurved, apex obtuse. *Calyx* probably dull grey-green; *tube* 2.5-4 mm long, outer surface densely hairy, rarely moderately hairy [(54-)100-171 hairs/mm^2], hairs mostly strongly curled, 0.1-0.4 mm long, sparsely to moderately glandular [12.5-50 glands/mm^2], inner surface glabrous; *abaxial lobe* very broadly ovate to ovate, rarely depressed ovate, (1.5-)2-4.4 mm long, 2.6-4.2 mm wide [length to width ratio (0.4-)0.9-1.3], apex obtuse (rarely rounded), outer surface sparsely to densely hairy [21-139.5 hairs/mm^2], hairs mostly strongly curled [as for calyx tube], sparsely glandular [c. 20-25 glands/mm^2]; *adaxial lobe* depressed ovate to broadly ovate, (2.5-)4-8.5 mm long, 4.4-8.1 mm wide [length to width ratio 0.6-1.2], apex ± trilobed, outer surface moderately to densely hairy [83-140.7 hairs/

mm^2], hairs mostly strongly curled [as for calyx tube], sparsely to moderately glandular [as for calyx tube], inner surface densely hairy [100-140.5 hairs/mm^2], sparsely to moderately glandular (as for calyx tube); [adaxial lobe length to abaxial lobe length ratio 1.2-2]. *Corolla* 12-20 mm long, pale blue to faintly violet, outer surface moderately hairy [c. 100 hairs/mm^2], hairs tightly curled, 0.1-0.4 mm long, longer on margin of lobes, inner surface glabrous, glands absent; tube 14-15 mm long, diameter at mouth 4-7 mm; *abaxial median lobe* spathulate or obvate, 3.4-6 mm long, 3-4.7 mm wide [length to width ratio 0.7-1.3], apex slightly irregular and rounded, often retuse (sinus up to c. 0.9 mm long); *lateral lobes* very broadly ovate to broadly ovate or broadly oblong, 2.3-4.3 mm long, 3.2-4.7 mm wide [length to width ratio 0.6-1.3], apex obtuse; *adaxial median lobe-pair* depressed obvate to very broadly obvate, 2.2-5 mm long, 5-8.2 mm wide [length to width ratio 0.4-0.7], apex slightly irregular and rounded, bilobed (sinus 0.8-2.6 mm long). *Stamens* inserted 4.8-6.5 mm above base of corolla; filaments (4.5-)8-9.5 mm long, glabrous; anthers 1.2-1.7 mm long, lobes cristate on basal dorsal surface and basally with small acumen, connective basally extended to form a basal appendage 0.7-1.4 mm long, distally tapering into a narrowly triangular trichome. *Disc* c. 1 mm high. *Pistil* 16-17.5 mm long; *ovary* cylindrical-obovoid, c. 0.6-0.7 mm long, diameter at base c. 0.8 mm, lobes 0.1-0.2 mm long, moderately to densely glandular throughout; *style* 14.5-15.7 mm long, moderately to densely glandular basally; *stigma lobes* 0.4-0.6 mm long. *Fruiting calyx* enlarged (abaxial lobe 6-9.5 mm long, 6-7 mm wide [length to width ratio 0.9-1.4]; adaxial lobe 12-16.5 mm long, 10-15 mm wide [length to width ratio 1-1.2]; [adaxial lobe length to abaxial lobe length ratio 1.6-2.5]). *Mericarps* 2.5-2.6 mm long, surface often becoming irregularly 3-ribbbed when mature, distally 0.7-0.9 mm extended beyond base of style, distal diameter c. 3.6 mm, moderately to densley glandular throughout [100-117 glands/mm^2]; seeds ± ellipsoid, c. 1.3 mm long, c. 0.5 mm wide. Figure 6g-i.

Specimens examined. WESTERN AUSTRALIA: South-West (Irwin): *Beard* & *Lullfitz* L34, anno 1961, Wilroy (PERTH); *Gardner 12069*, 5.i.1959, Yuna (PERTH); *Gardner* 14266, 19.xii.1962, Hutt River (PERTH - Type); *George* 16408, 19.x.1984, on the Coonawa Road, c. 30 km (by road) E of Yuna (PERTH); *Lullfitz* L2994, 14.xi.1963, Wilroy (KP); *Lullfitz* L4581, 8.xii.1965, Wilroy (KP); *Rogerson* s.n., -.x.1961, Wilroy Siding (PERTH).

Distribution. Endemic to the South-West Botanical (Irwin) province of Western Australia. Figure 13.

Ecology. Occurs 'in gravelly sand on disturbed road verge' (*George* 16408).

Notes. This species has close affinities with *P. wilkieana* (refer 'Notes' under this latter species for details).

Conservation status. Very rare and probably endangered (Risk Code = 3E, (Conn in Leigh et al. 1981, pp. 49 & 73; Leigh et al. 1984, pp. 238 & 239). For further details refer Leigh et al. (1984). Attempts to recollect this species from the same locality as that of *George* 16408 were unsuccessful. It appears that this population no longer exists.

15. **Prostanthera splendens** Conn, sp. nov. (Figure 7c)

Species nova Sectionis *Prostantherae*. *Frutices* 0.4-0.5 m alti. *Rami* et ramuli teretes, pilis moderatis vestita, pilis 0.1-0.3 mm longis, glandibus moderatis usque densis vestita. *Folia* pilis dissitis vestita, glandibus sparsis usque densis vestita; *petiolus* absens vel usque ad 0.6 mm longus; *lamina* transverse elliptica vel transverse ovata usque transverse late elliptica vel transverse late ovata, 3.5-6 mm longa, 6-8 mm lata, basi rotundata usque truncata, margine integro et valde recurvato, apice late rotundato. *Pedicellus florum* 2-2.8 mm longus, pilis sparsis usque moderatis vestita, pilis 0.1-0.3 mm longis; *prophyllis* 0.4-0.5 mm e basi calycis affixa, obovatis usque anguste obovatis, 2-4 mm longis, circa 1 mm latis. *Calyx* probabiliter viridis cum purpureus suffusus, extra glaber vel pilis dissitis vestita, glandibus moderatis vestita, interius glaber, glandibus moderatis vestita; *tubus* 4.3-4.7 mm longus; *lobus abaxialis* depresse ovatus usque late ovatus, 3.2-4.3 mm longus, 4-5 mm latus, apice obtuso usque rotundato; *lobus adaxialis*

Figure 7. a - *Prostanthera petrophila*. Twig and flowers (*Gardner* 2530). b - *P. centralis*. Twig and flowers (*Chinnock* 510). c - *P. splendens*. Twig and flowers (*Newbey* 8541).

depresse ovatus, 3.6-4 mm longus, 6.3-6.5 mm latus, apice rotundato. *Corolla* 10-15 mm longa, pallida purpurea, cum purpurea maculae in interius paginae abaxialis, extra glabra vel pilis moderatis vestita, glandibus moderatis vestita, interius pilis moderatis vestita, glandibus absentibus; *tubus* 8.5-9.8 mm longus; *lobus abaxiali-medianus* spathulatus vel latissime obovatus usque late obovatus, 4-5.6 mm longus, 3-5.2 mm latus, apice rotundato, retuso, sinu usque ad circa 0.9 mm longo, *lobis lateralibus* late ovatis usque late ellipticis, 3.3-4.9 mm longis, 2.9-4 mm latis, apice obtuso, *pari loborum adaxiali-mediano* depresse ovato usque latissime ovato, 4.2-6.5 mm longo, 4.9-8.7 mm lato, apice leviter irregulari et rotundato, bilobato, sinu 2-3.5 mm longo. *Stamina* 6.5-7 mm e basi corollae affixa; filamenta 2.6-5 mm longa; antherae 1.2-1.5 mm longae, appendice 1-1.5 mm longa. *Pistillum* 10.2-11 mm longum; ovarium circa 0.7 mm longum; stylus circa 9.5 mm longus; lobis stigmatis circa 0.8 mm longis. *Calyx fructus* leviter auctus. *Mericarpia* circa 2.3 mm longa, glandibus absentibus.

Typus: *Newbey* 8541, 16.viii.1981, 30 km E of Widgiemooltha (holo: MEL 1552699; iso: AD, MEL 630298, NSW, PERTH).

Small spreading shrub, 0.4-0.5 m high. *Branches* terete, moderately hairy [26-50 hairs/mm^2], hairs ± straight, subpatent, 0.1-0.3 mm long, multicelled, moderately to densely glandular [46-77 glands/mm^2]. *Leaves* bright mid-green, abaxial surface paler than adaxial surface, aromatic abaxial surface with an occasional hair at base and on midrib, densely glandular (glands touching each other) [80-90 glands/mm^2], adaxial surface glabrous, sparsely glandular [up to c. 20 glands/mm^2]; *petiole* absent or up to 0.6 mm long; *lamina* transversely elliptic or transversely ovate to transversely broad-elliptic or transversely broad-ovate, 3.5-6 × 6-8 mm [length to width ratio 0.5-0.8, length of maximum width from base to total lamina length 0.4-0.5], base rounded to truncate, margin entire and strongly recurved, apex broadly rounded; venation faint to indistinct on abaxial surface, midrib faint and slightly raised on abaxial surface. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 4-10-flowered [per conflorescence]. *Pedicel* 2-2.8 mm long, sparsely to moderately hairy [up to c. 55 hairs/mm^2], hairs ± straight, subpatent, 0.1-0.3 mm long, multicelled, moderately to densely glandular [60-85 glands/mm^2]; *prophylls* inserted 0.4-0.5 mm from base of calyx [a_1 axis to anthopodium ratio 3-4.2], opposite, obovate to narrowly obovate, 2-4 mm long, c. 1 mm wide [length to width ratio 2-4, length of maximum width from base to total lamina length ratio 0.7-0.8], glabrous, sparsely to moderately glandular [up to c. 37 glands/mm^2], base attenuate, margin entire, apex obtuse. *Calyx* green with purple tinge distally and on adaxial part of tube or maroon throughout; outer surface glabrous or with a few hairs at base and/or on margin of lobes, moderately glandular [30-42 glands/mm^2]; inner surface glabrous, moderately glandular basally [c. 25 glands/mm^2], glands also present near margin; *tube* 4.3-4.7 mm long; *abaxial lobe* depressed to broadly ovate, 3.2-4.3 mm long, 4-5 mm wide [length to width ratio 0.6-1], apex obtuse to rounded; *adaxial lobe* depressed ovate, 3.6-4 mm long, 6.3-6.5 mm wide [length to width ratio c. 0.6], apex rounded; [adaxial lobe length to abaxial lobe length ratio 0.9-1.1]. *Corolla* 10-15 mm long, tube and lobes mauve to light purple, inner surface of tube paler than outer surface, inner abaxial surface of tube and base of abaxial median lobe with mauve to red-brown dots; outer surface glabrous or moderately hairy [up to c. 42 hairs/mm^2], hairs c. 0.2 mm long, moderately glandular distally [30-50 glands/mm^2] (lobes densely glandular in bud); inner surface glabrous basally, moderately hairy in mouth and base of lobes [50-63 hairs/mm^2], glands absent; *tube* 8.5-9.8 mm long, diameter at mouth 4.3-4.6 mm; *abaxial median lobe* spathulate or very broadly to broadly obovate, 4-5.6 mm long, 3-5.2 mm wide [length to width ratio 0.9-1.6], apex rounded and retuse (sinus up to c. 0.9 mm long); *lateral lobes* broadly oblong to broadly elliptic, 3.3-4.9 mm long, 2.9-4 mm wide [length to width ratio 1.1-1.2], apex obtuse; *adaxial median lobe-pair* depressed to very broadly ovate, 4.2-6.5 mm long, 4.9-8.7 mm wide [length to width ratio 0.6-1.1], apex slightly irregular and rounded, bilobed (sinus 2-3.5 mm long). *Stamens* inserted 6.5-7 mm above base of corolla; filaments 2.6-5 mm long, glabrous; anthers 1.2-1.5 mm long, not cristate dorsally, connective extended to form a basal appendage 1-1.5 mm long, terminating in several (± 10) narrowly triangular trichomes. *Disc* 0.9-1 mm high. *Pistil* 10.2-11 mm long; *ovary* c. 0.7 mm long, diameter at base c. 1 mm, lobes c. 0.2 mm long, smooth, glands absent; *style* c. 9.5 mm long; *stigma lobes* c. 0.8 mm long. *Fruiting calyx* slightly

enlarged (abaxial lobe 5-5.7 mm long, 4-5 mm wide [length to width ratio 1.1-1.3]; adaxial lobe 6-7.5 mm long, 5.5-7 mm wide [length to width ratio c. 1.1]; [adaxial lobe length to abaxial lobe length ratio 1.2-1.3]). *Mericarps* c. 2.3 mm long, distally 1-1.1 mm extended beyond base of style, distal diameter c. 2.5 mm, smooth, glands absent; seeds ellipsoid, c. 1.3 mm long, c. 0.7 mm wide.

Specimens examined. WESTERN AUSTRALIA: Eremaean (Coolgardie): 1.ix.1985, 30 km E of Coolgardie to Esperance Highway, on road to Binneringie Homestead: *Conn* 1898 (MEL, NSW, PERTH); *Conn* 1899 (BRI, MEL, MO, NSW, PERTH); *Conn* 1900 (MEL, CANB); *Conn* 1901 (MEL); *Conn* 1902 (MEL); *Conn* 1903 (AD, MEL); *Conn* 1904 (MEL, NSW, PERTH); *Newbey* 8541, 16.viii.1981, 30 km E. of Widgiemooltha [same locality as *Conn* 1898-1904] (AD, MEL, NSW, PERTH - Type).

Distribution. Endemic to the Eremaean Botanical Province (Coolgardie District) of Western Australia. Figure 13.

Ecology. Occurs in 'well-drained, stony loam [soils, on a] moderately exposed rim of breakaway... in *Eucalyptus stricklandii* Open Low Woodland' (*Newbey* 8541).

Notes. Most readily distinguished by the transversely elliptic or transversely ovate leaves which have strongly recurved margins.

Conservation status. Only known from the type locality. Newbey records that its distribution is 'scattered in patches' (*Newbey* 8541). Risk Code = 1K.

16. **Prostanthera petrophila** Conn, sp. nov. (Figure 7a)

Species nova Sectionis *Prostantherae*. *Frutices* 0.6-1.5 m alti. *Rami* et ramuli teretes usque subangulares, pilis densis vestita, pilis circa 0.2 mm longis, glandibus absentibus. *Folia* glabra vel pilis sparsissimis vestita; *petiolus* absens vel 0.6-1 mm longus; *lamina* anguste obovata, 8.5-14 mm longa, 2-3 mm lata, basi attenuata et decurrenti, margine integro, apice obtuso usque rotundato. *Pedicellus florum* 2-2.3 mm longus, pilis densis vestita, pilis circa 0.2 mm longis, glandibus absentibus; *prophyllis* anguste ovatis usque linearibus, 0.5-0.8 mm longis, 0.1-0.2 mm latis. *Calyx* dilutus viridis; extra glaber vel pilis sparsissimis vestita ad basim, glandibus absentibus; interius pilis moderatis usque densis vestita distaliter, glandibus absentibus; *tubus* 2-4 mm longus; *lobus abaxialis* depresse ovatus, 1-1.4 mm longus, 3-3.3 mm latus, apice rotundato, raro emarginato; *lobus adaxialis* depresse ovatus usque latissime ovatus, 3.1-3.6 mm longus, 5-5.2 mm latus, apice obtuso. *Corolla* 5-6 mm longa, alba, striae fauci et lobis violaceae; extra glabra, interdum pilis prope marginem et apicem loborum, glandibus absentibus; interius glabra basaliter, pilis sparsis usque moderatis vestita distaliter, glandibus absentibus; *tubus* 4-5 mm longus; *lobus abaxiali-medianus* spathulatus, 4.2-5 mm longus, 2.2-4 mm latus, apice rotundato, *lobis lateralibus* ovatis usque oblongis, 4.3-5 mm longis, 2.5-3.5 mm latis, apice obtuso usque rotundato, *pari loborum adaxiali-mediano* latissime obovato, 5-6 mm longo, 7-7.8 mm lato, apice rotundato et bilobato, sinu 3-3.5 mm longo. *Stamina* circa 3.5 mm e basi corollae affixa; filamenta 2.5-3 mm longa; antherae 0.9-1 mm longae, appendice absenti. *Pistillum* 5.5-6 mm longum; ovarium circa 0.4 mm longum, glabrum; stylus 4.5 mm longus; lobis stigmatis 0.5-0.6 mm longis. *Calyx fructus* auctus. *Mericarpia* 1.8-2 mm longa, glabra.

Type: *Gardner* 2530, 23.viii.1931, Mt Barloweerie, Western Australia (holo: PERTH - lower left specimen; iso: K, PERTH - upper right specimen).

Spreading shrub, 0.6-1.5 m high. *Branches* terete to subangular, very densely hairy [150- c. 300 hairs/mm^2], hairs ± straight, appressed, antrorse, c. 0.2 mm long; glands absent. *Leaves* glabrous or very sparsely hairy (usually more densely hairy on petiole) [up to c. 18.5 hairs/mm^2]; with a few scattered glands; *petiole* absent or 0.6-1 mm long; *lamina* narrowly obovate, 8.5-14 × 2-3 mm [length to width ratio 3-7, length of maximum width from base to total lamina length ratio 0.5-0.8], base attenuate and decurrent (hence petiole often appearing absent), margin entire, apex obtuse to rounded; venation (including midrib) not visible. *Inflorescence* a frondose racemiform conflorescence,

uniflorescence monadic, sometimes with 1 accessory bud; c. 10-16-flowered [per conflorescence]. *Pedicel* 2-2.3 mm long, densely hairy [150-200 hairs/mm^2]; hairs c. 0.2 mm long; glands absent; *prophylls* inserted on basal half of pedicel [a_1 axis to anthopodium ratio 0.4-1.2], opposite, narrowly ovate to linear, 0.5-0.8 mm long, 0.1-0.2 mm wide [length to width ratio 4-7, length of maximum width from base to total lamina length ratio 0.2-0.4], prophylls not contracted at base, margin entire, apex obtuse, with a few scattered hairs. *Calyx* ? light green; outer surface glabrous, except for an occasional hair at base, glands absent; inner surface glabrous on basal half of tube, moderately hairy in mouth, moderately to densely hairy on abaxial lobe and basal half of adaxial lobe [90-100 hairs/mm^2], glands absent; *tube* 2-4 mm long; *abaxial lobe* depressed ovate, 1-1.4 mm long, 3-3.3 mm wide [length to width ratio 0.3-0.4], apex rounded, rarely emarginate (sinus up to 0.3 mm long); *adaxial lobe* depressed to very broadly ovate, 3.1-3.6 mm long, 5-5.2 mm wide [length to width ratio 0.6-0.7], apex obtuse; [adaxial lobe length to abaxial lobe length ratio 2.2-3]. *Corolla* 5-6 mm long, white, with violet striations in throat and on lobes; outer surface glabrous, sometimes with an occasional hair near margin and apex of lobes, glands absent; inner surface glabrous on basal part of tube, sparsely hairy in throat, moderately hairy in mouth and on lobes [58-86 hairs/mm^2], hairs weak and loosely tangled, 0.4-0.7 mm long, glands absent; *tube* 4-5 mm long, diameter at mouth 2.5-3 mm; *abaxial median lobe* spathulate, 4.2-5 mm long, 2.2-4 mm wide [length to width ratio 1.3-1.5], apex rounded; *lateral lobes* ovate to oblong, 4.3-5 mm long, 2.5-3.5 mm wide [length to width ratio 1.4-1.7], apex obtuse to rounded; *adaxial median lobe-pair* very broadly obovate, 5-6 mm long, 7-7.8 mm wide [length to width ratio 0.7-0.9], apex rounded and deeply bilobed (sinus 3-3.5 mm long). Stamens inserted c. 3.5 mm above base of corolla; filaments 2.5-3 mm long, glabrous; anthers 0.9-1 mm long, not cristate, lobes with small basal acumen c. 0.1 mm long, connective not extended, hence appendage absent. *Disc* c. 0.4 mm high. *Pistil* 5.5-6 mm long; *ovary* obovoid, c. 0.4 mm long, diameter at base 0.6-0.8 mm, lobes less than 0.1 mm long, glabrous; *style* 4.5 mm long; *stigma lobes* 0.5-0.6 mm long. *Fruiting calyx* enlarged (abaxial lobe 2-2.2 mm long, 4.2-4.6 mm wide [length to width ratio c. 0.5]; adaxial lobe 5.9-6.2 mm long, 6.6-7.2 mm wide [length to width ratio 0.8-0.9]; [adaxial lobe length to abaxial lobe length ratio 2.8-3.1]). *Mericarps* 1.8-2 mm long, distally 0.6-0.7 mm extended beyond base of style, distal diameter 2-2.5 mm, glabrous, ± smooth; seeds cylindrical-ellipsoid, c. 1.3 mm long, c. 0.5 mm wide.

Specimens examined. WESTERN AUSTRALIA: Eremaean (Austin): *Gardner* 2530, 23.viii.1931, Mt Barloweerie (K, PERTH - Type); (?*Gardner* &) *Blackall* 511, 23.viii.1931, hills between Murgoo and Wooleen Station (PERTH); *Wittwer* W.1265, 1.viii.1974, Cue (KP).

Distribution. Endemic to the Eremaean Botanical Province (Austin District) of Western Australia. Figure 12.

Ecology. Occurs on laterite mesa - derived soils with *Acacia* sp. (*Wittwer* W.1265), and 'in rock crevices' (*Gardner* 2530).

Notes. This species has close affinities with *P. campbellii*. Both species have similar indumentum on the inner surface of the corolla, anthers which are not cristate and which lack an appendage, and a white corolla which has purple/violet striations. *P. petrophila* differs from *P. campbellii* by having narrowly obovate leaves (length to width ratio 3-7) whereas the latter species has linear leaves (length to width ratio 13.9-39), and the prophylls only have an occasional hair in *P. petrophila*, but are moderately to densely hairy in *P. campbellii*.

Conservation status. Not known.

17. **Prostanthera eurybioides** F. Muell., Defn Austral. Pl. 15 & 16 (June-July [Seberg 1986] 1855); Trans. Phil. Soc. Victoria 1: 48 & 49 (Sept. 1855); J. Bot. Kew Gard. Misc. 8: 168 (1856); Fragm. 6: 105 (1867); Benth., Fl. Austral. 5: 105 (1870); Tate, Trans. & Proc. Roy. Soc. S. Austral. 3: 78 (1880); op. cit. 12: 111 (1889); Handb. Fl. Extratrop. Fl. S. Austral. 150 (1890); J.M. Black, Fl. S. Austral. 3: 491 (1926); op. cit. 2nd edn 4: 738

(1957); Althofer, Cradle of Incense 146, 148, 150-153 (1978). *Lectotype* (here chosen): *Mueller* s.n., -.x.1848, 'In arenosis inter frutices inter flumen Murray [?] & montem Barkeri (Murray Shrub [?Scrub]') (lecto: MEL 43158). *Possible other syntype*: *Mueller* s.n., s.dat., 'Murray Scrub' (MEL 43157) [refer Typification].

Low spreading shrub, less than 1 m high, diameter c. 1 m. *Branches* ± terete, densely hairy [c. 100 hairs/mm^2], more densely hairy from one leaf axil region to the next more distal nodal region between the opposite leaf bases [up to c. 350 hairs/mm^2], hairs curled, 0.1-0.2 mm long. *Leaves* clustered on short shoots, thick, glabrous or sparsely hairy [15-35 hairs/mm^2], sparsely glandular [15-50 glands/mm^2], strongly scented when crushed; *petiole* absent or up to 0.1 mm long; *lamina* elliptic to ovate, (1.5-)2-2.5 × (0.6-)1-2(-2.2) mm [length to width ratio (1.1-)1.5-2.5, length of maximum width from base to total lamina length ratio 0.2-1], base obtuse to rounded, margin entire, apex obtuse; venation (including midrib) not visible. *Inflorescence* a frondose racemiform conflorescence (leaves of inflorescence with bases ± cuneate to rounded), uniflorescence monadic; (6-)12-14- flowered [per conflorescence]. *Pedicel* 0.5-1.3 mm long, moderately hairy [30-67 hairs/mm^2], hairs 0.2-0.3 mm long, sparsely to moderately glandular [16-30(-50) glands/mm^2]; *prophylls* inserted on distal half of pedicel, often near base of calyx [a_1 axis to anthopodium ratio (1.3-)2.5-8], overlapping basal part of calyx, opposite, narrowly elliptic, 1.3-1.7 mm long, (0.2-) c. 0.5 mm wide [length to width ratio 2.5-3.4(-7), length of maximum width from base to total lamina length ratio 0.4-0.5], sparsely to moderately hairy [16-66 (c. 100) hairs/mm^2] or hairs restricted to margin, hairs c. 0.1 mm long, sparsely glandular [16-33 glands/mm^2], base ± attenuate, margin entire and ± straight, apex obtuse to subrounded. *Calyx* midgreen with a red tinge on the distal parts of the tube, or maroon tinge distally (especially on lobes); outer surface with an occasional hair present [c. 3 hairs/mm^2], hairs c. 0.1 mm long, moderately glandular [10-23 glands/mm^2], glands ± hemispherical; margin of lobes with hairs present; inner surface glabrous, glands absent; *tube* 2.5-3 mm long; *abaxial lobe* very broadly ovate to very broadly oblong, 1.7-3.1 mm long, 2.3-3.5 mm wide [length to width ratio 0.6-0.9], apex rounded to subtruncate, often slightly undulate and/or slightly irregular, sometimes retuse (sinus up to c. 0.2 mm long); *adaxial lobe* depressed ovate, 1.5-2.2 mm long, c. 2.5-3.9 mm wide [length to width ratio 0.6], apex rounded, [adaxial lobe length to abaxial lobe length ratio 0.6-0.8]. *Corolla* 10-12 mm long, violet to midpurple, inner abaxial surface of mouth and distal part of tube white with mid-brown to light orange (or yellow) dots present (often in 4 irregular rows), laterally with numerous small dark purple dots; outer surface glabrous, or with an occasional hair near margin of lobes, sparsely glandular [up to c. 1 gland/mm^2]; inner surface glabrous; *tube* 6-7 mm long, diameter at mouth c. 4 mm; *abaxial median lobe* spathulate, 2.6-4.8 mm long, 3.9-4.7 mm wide (2-2.9 mm wide at base) [length to width ratio 0.6-1.1], apex rounded and slightly irregular, emarginate (sinus 0.5- c. 1 mm long); *lateral lobes* ovate to broadly ovate, 4-6 mm long, 3-3.5 mm wide [length to width ratio c. 1-2], contracted basally (1-2 mm wide at base), apex subtruncate and irregular; *adaxial median lobe-pair* depressed ovate, 3-6 mm long, 6.8-11.7 mm wide [length to width ratio c. 0.5], apex irregular and rounded, emarginate to almost bilobed (sinus 0.7-2.6 mm long). *Stamens* inserted 2.5-4.6 mm above base of corolla; filaments 3.3-5.5 mm long, glabrous; anthers 1-2 mm long, purple laterally, base of lobes with a minute acumen less than 0.1 mm long, connective cristate (triangular trichomes c. 0.1 mm long), extended to form a basal appendage 0.6-0.8 mm long, distal end of appendage with c. 6-12 triangular trichomes 0.1-0.2 mm long. *Disc* c. 0.5 mm high. *Pistil* 5-7 mm long; *ovary* cylindrical-obovoid, 0.4-0.9 mm long, diameter at base 0.5 mm, lobes c. 0.1-0.2 mm long; *style* c. 4-6 mm long; *stigma lobes* 0.4-0.5 mm long. *Fruiting calyx* not or only slightly enlarged (abaxial lobe 2.6-3.3 mm long, 2.3-3.9 mm wide [length to width ratio 0.9-1.1]; adaxial lobe 1.6-2.5 mm long, 3.4-3.5 mm wide [length to width ratio 0.5-0.7]); [adaxial lobe length to abaxial lobe length ratio 0.6-0.8]. *Mericarps* 1-2.4 mm long, distally c. 0.4-1.2 mm extended beyond base of style, distal diameter 1.5-1.9 mm; seeds flattened ellipsoid-cylindrical, c. 1.6 mm long, c. 0.6 mm wide. Figure 8a-e.

Selected specimens examined (49 examined). SOUTH AUSTRALIA: Murray Mallee: Northern Calcarenite Ridges and Plains (Keith): *Crisp* s.n., -.viii.1973, Mt Monster (AD); *Kraehenbuehl* 217, 1.x.1960, near Mt Monster (AD, MEL); (Pallamana): *Barker*

et al. 4091, 10.viii.1980, Preamimma Creek (AD); *Carrick* 3311, s. dat., 6.5 miles W of Murray Bridge (AD, MEL); *Carrick* 3373 , 22.vii.1973, 5 miles W of Murray Bridge towards Kinchina (AD, MEL); *Conn* 2458 & 2459, 30.ix.1985, Preamimma Creek (MEL). - Mt Lofty Block: Peninsula Uplands (Sandergrove): *Ising* & *Rothe* s.n., 24.x.1919, (probably N of) Monarto South (AD 97650190); (Hahndorf): *Mueller* s.n., s. dat.(? -.x.1848), near Mt Barker (MEL 43156); [*Adelaide University*] *Student* s.n.,-.ix.1938, Mt Barker (AD 96911062).

Distribution. Endemic to the Murray Mallee and the Mt Lofty Block provinces of South Australia. Figure 12.

Ecology. It occurs amongst rocky granite outcrops near Mt Monster, and amongst *Eucalyptus* - mallee woodlands on sandy loam soils with granite outcrops in the Kinchina/ Preamimma Creek area.

Typification. The lectotype (*Mueller* s.n., -.x.1848 (MEL 43158)) of *P. eurybioides* is morphologically in close agreement with the protologue (Mueller 1855a). However, the locality details of this specimen are slightly at variance with that given in the protologue (namely, 'In the Mallee Scrub towards the mouth of the Murray River' (Mueller 1855a, p. 49)).

Notes. Although Mueller and an Adelaide University student collected this species from Mt Barker it is not to be found there today. However, it is possible that they used 'Mt Barker' to refer to a much broader area, which may have included the Kinchina/ Preamimma area.

The small leaves are unusual for species of this Section. They are reminiscent of those of *P. serpyllifolia* ssp. *microphylla* (Section *Klanderia*, refer Conn 1984).

Conservation status. Only known from a few scattered localities and only a few plants are known in each area. It is endangered (Risk Code = 2E (Conn in Leigh et al. 1981, pp. 49 & 86; Leigh et al. 1984, pp. 237 & 238) since it occurs in areas which are intensively cultivated and is not included in any conservation reserves. If the planned development of Monarto South had proceeded, the small population in that area would have been destroyed. For further details refer Leigh et al. (1984).

The Black Hill Native Flora Research Unit of the South Australian National Parks and Wildlife Service have developed a technique for tissue culture of this species, as well as conventional cutting propagation. They plan to reintroduce propagated plants to selected localities to supplement remnant populations (Williams, pers. comm 1984).

18. **Prostanthera nanophylla** Conn, sp. nov. (Figure 8f)

Species nova Sectionis *Prostantherae*. *Frutices* circa 0.1-1 m alti. *Rami* et ramuli plus minusve teretes, pilis sparsis usque densis vestita, pilis 0.1-0.3 mm longis, glandibus moderatis vestita. *Folia* glabra vel pilis sparsissimis vestita, glandibus moderatis vestita; *petiolus* absens vel usque ad circa 0.4 mm longus; *lamina* ovata vel elliptica usque anguste oblonga, 1.3-4.6 mm longa, 0.7-1.4 mm lata, basi breviter attenuata usque obtusa, margine integro, apice obtuso usque subrotundato. *Pedicellus florum* 1.2-1.3 mm longus, pilis moderatis usque densis vestita, pilis circa 0.1 mm longis; *prophyllis* e tertio distali pedicello affixis, anguste ellipticis usque anguste obovatis, vel subrhombicis usque ovatis, (1.4-)2-4.3 mm longis, 0.4-0.9 mm latis. *Calyx* viridis; tubus 1.3-2.3 mm longus, extra pilis sparsis vestita, glandibus moderatis vestita, interius pilis absens, glandibus sparsis vestita; *lobus abaxialis* late oblongus, 2.9-3.9 mm longus, 2.5-3.4 mm latus, apice rotundato et saepe leviter retuso, extra pilis sparsis usque moderatis vestita, glandibus moderatis vestita, interius pilis sparsis vestita, glandibus sparsissimis vestita; *lobus adaxialis* depresse ovatus usque latissime ovatus, 3.2-4.6 mm longus, 5.7-6.5 mm latus, apice irregulari usque leviter trilobato, extra pilis sparsissimis vestita, glandibus moderatis vestita, interius pilis sparsis vestita, glandibus sparsissimis vestita. *Corolla* 8-14 mm longa, caerulea usque alba, cum probabiliter aurantiaca usque brunnea vel purpurea maculae in interius paginae abaxialis, extra basaliter pilis absens, alibi pilis

sparsis vestita, glandibus sparsis vestita, interius pilis moderatis usque densis vestita, glandibus sparsis vestita; *tubus* 7.4-10.1 mm longus; *lobus abaxiali-medianus* late obovatus usque obovatus vel subspathulatus, 5.9-7.1 mm longus, 4.2-5.5 mm latus, apice irregulari et rotundato, retuso, sinu 0.6-0.8 mm longo, *lobis lateralibus* latissime ovatis usque ovatis vel oblongibus, 2.6-4.6 mm longis, 2.2-3.6 mm latis, apice rotundato, *pari loborum adaxiali-mediano* depresse ovato, 2.6-3.1 mm longis, 6-7.8 mm latis, apice irregulari et rotundato, saepe retuso usque bilobato, sinu usque ad circa 2 mm longo. *Stamina* circa 3 mm e basi corollae affixa; filamenta 2.9-4.6 mm longa; antherae 0.8-1 mm longae, appendice 0.8-0.9 mm longa. *Pistillum* circa 8 mm longum; ovarium circa 1.3 mm longum, glandibus distaliter; stylus circa 6.8 mm longus; lobis stigmatis circa 0.5 mm longis. *Calyx fructus* auctus. *Mericarpia* non visus.

Figure 8. a-e - *Prostanthera eurybioides*. a - Twig and flowers. b - Detail of branchlet. c - Open corolla. d - Open calyx showing gynoecium. e - Stamens, ventral and dorsal views. (*Ising* s.n.). f - *P. nanophylla*. Twig and flowers (*B. Smith* 189).

Typus: *Weber* 5220, 20.x.1975, c. 27 km W of Koorda along the Rabbit Proof Fence, Western Australia (holo: MEL 1552759; iso: AD 97548059, CANB, K, MEL 1552760, MO, NSW, PERTH).

Small shrub, c. 0.1-1 m high. *Branches* ± terete, laterally compressed distally, sparsely to densely hairy [26-113 hairs/mm^2]; hairs straight to curled, subpatent, antrorse to retrorse, 0.1-0.3 mm long, white; moderately glandular [36-58.3 glands/mm^2]. *Leaves* clustered on short axes and arranged (unclustered) along long axes, green, glabrous or with a few scattered hairs (especially on margin); hairs usually curled, c. 0.1 mm long; moderately glandular [c. 50-63 glands/mm^2]; *petiole* absent or up to c. 0.4 mm long; *lamina* ovate or elliptic to narrowly oblong, 1.3-4.6 × 0.7-1.4 mm [length to width ratio 1.2-3.3, length of maximum width from base to total lamina length ratio 0.3-0.5], base shortly attenuate to obtuse, margin entire, apex obtuse to subrounded; venation not visible, midrib sometimes faint basally. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 6-10-flowered [per conflorescence]. *Pedicel* 1.2-1.3 mm long, moderately to densely hairy [50-100 hairs/mm^2], hairs c. 0.1 mm long, moderately glandular [33-67 glands/mm^2]; *prophylls* inserted on distal third of pedicel, usually near base of calyx [a_1 axis to anthopodium ratio 8.5-50], opposite, narrowly elliptic to narrowly obovate, or subrhombic to ovate (with distinct petiole - *Wrigley* CBG 31054), (1.4-)2-4.3 mm long, 0.4-0.9 mm wide [length to width ratio (1.6-)7.2-9.8, length of maximum width from base to total lamina length ratio 0.4-0.7], moderately to densely hairy [50-100 hairs/mm^2], moderately glandular [33-67 glands/mm^2], base attenuate (obtuse when subrhombic to ovate), margin entire, apex obtuse. *Calyx* green to maroon; *tube* 1.3-2.3 mm long, outer surface sparsely hairy [23-26 hairs/mm^2], moderately glandular [32-65 glands/mm^2], inner surface glabrous, sparsely glandular [c. 16 glands/mm^2]; *abaxial lobe* broadly oblong, 2.9-3.9 mm long, 2.5-3.4 mm wide [length to width ratio c. 1.2], apex rounded, often slightly retuse, outer surface sparsely to moderately hairy (more densely hairy near and on margin)(24-38 hairs/mm 2), moderately glandular [c. 33-37 glands/mm^2], inner surface sparsely hairy [16-20 hairs/mm^2], very sparsely glandular [up to c. 0.5 glands/mm^2]; *adaxial lobe* depressed to very broadly ovate, 3.2-4.6 mm long, 5.7-6.5 mm wide [length to width ratio 0.5-0.8], apex irregular to slightly 3-lobed, outer surface with a few scattered hairs, moderately glandular [c. 37 glands/mm^2], inner surface sparsely hairy [c. 22 hairs/mm^2], very sparsely glandular [3-4 glands/mm^2]; [adaxial lobe length to abaxial lobe length ratio 1-1.3]. *Corolla* 8-14 mm long, mauve, blue to white, inner surface with ? orange to dull brown, maroon or purple spots on abaxial surface; outer surface glabrous basally, sparsely hairy distally [16-20 hairs/mm^2], with a few scattered glands; inner surface moderately to densely hairy [35-126 hairs/mm^2], with an occasional gland; *tube* 7.4-10.1 mm long, diameter at mouth 4-5 mm; *abaxial median lobe* broadly obovate to obovate or subspathulate, 5.9-7.1 mm long, 4.2-5.5 mm wide [length to width ratio 1.2-1.5], apex slightly irregular and rounded, retuse (sinus 0.6-0.8 mm long); *lateral lobes* very broadly ovate to ovate or oblong, 2.6-4.6 mm long, 2.2-3.6 mm wide [length to width ratio 0.8-1.4], apex rounded; *adaxial median lobe-pair* depressed ovate, 2.6-3.1 mm long, 6-7.8 mm wide [length to width ratio c. 0.4], apex irregular and rounded, often retuse to deeply bilobed (sinus up to c. 2 mm long). *Stamens* inserted c. 3 mm above base of corolla; filaments 2.9-4.6 mm long, glabrous; anthers 0.8-1 mm long, lobes with small basal acumen c. 0.2 mm long, cristate dorsally (not always conspicuous), connective extended to form a basal appendage 0.8-0.9 mm long, terminating in 1 or 2 narrowly triangular trichomes. *Disc* c. 0.3 mm high. *Pistil* c. 8 mm long; *ovary* ± cylindrical to cupiform, c. 1.3 mm long, diameter at base c. 1.3 mm, lobes c. 0.1 mm long, densely glandular distally; *style* c. 6.8 mm long; *stigma lobes* c. 0.5 mm long. *Fruiting calyx* enlarged (abaxial lobe 4 mm long, 4 mm wide [length to width ratio 1]; adaxial lobe c. 8 mm long, c. 11 mm wide [length to width ratio 0.7]); [adaxial lobe length to abaxial lobe length ratio 0.5]. *Mericarps* immature.

Specimens examined. WESTERN AUSTRALIA: Eremaean (Coolgardie): *Beard* 5172, 23.x.1967, 10 miles E of Southern Cross (KP); *Conn* 2230, 18.ix.1985, No. 2 Rabbit Proof Fence road junction with Cadoux-Koorda road (MEL); *Smith* 527, 6.xi.1984, 23.5 miles SE of Marvel Loch, on Mt Day Road (CBG, HO, MEL, PERTH). - South-West (Avon): *Smith* 189, 21.x.1982, No. 2 Rabbit Proof Fence on Cadoux to Koorda Road (MEL,

NSW, PERTH); *Weber* 5220, 20.x.1975, c. 27 km W of Koorda along Rabbit Proof Fence (AD, MEL - Type); (Roe): *Wrigley* CBG 31053 & CBG 31054, 10.xi.1968, 6 miles from Hyden towards The Hump (AD). - Locality Unknown: *Rosier* 422, -.x-xi.1963, 52 miles from Rabbit Proof Fence [probably near Koorda] (PERTH).

Distribution. Endemic to the Eremaean Botanical Province (Coolgardie District) and South-West Botanical Province (Avon & Roe Districts) of Western Australia. Figure 11.

Ecology. 'On yellow sand over laterite' (*Smith* 189), associated with 'Mallee, *Acacia*, *Grevillea* scrub' (*Smith* 527). Also grows in 'disturbed roadside verge in sandy soil' (*Conn* 2230).

Notes. The small leaves of this species, which are often clustered on short axes, readily distinguish it from the other Western Australian species of *Prostanthera* section *Prostanthera*. Vegetatively, this species is similar to *P. serpyllifolia* (section *Klanderia*, refer Conn 1984).

Conservation status. Not known. *Conn* 2230 records only one plant seen and *Smith* 189 records eight plants seen. However, *Smith* 527 notes that it is 'plentiful'.

19. **Prostanthera striatiflora** F. Muell., Linnaea 25: 425 (1852); Walpers, Ann. Bot. Syst. 5: 701 (1858); F. Muell., Rep. Pl. Babbage's Exped. 15 (1859); Ann. Rep. 1862-63, 14 (1863); Fragm. 6: 106 (1868); Benth., Fl. Austral. 5: 103 (1870) (p.p. included *P. lithospermoides*); F. Muell., Fragm. 9: 162 (1875); Tate, Trans. & Proc. Roy. Soc. S. Austral. 3: 78 (1880); Kemp, Trans. & Proc. Roy. Soc. S. Austral. 3: 136 (1880); Moore, Cens. Pl. New S. Wales 53 (1884); Woolls, Pl. New S. Wales 83 (1885); Cleland, Trans. & Proc. Roy. Soc. S. Austral. 10: 79 (1888); Tate, Trans. & Proc. Roy. Soc. S. Austral. 11: 98 (1889); op. cit. 12: 111 (1889); Handb. Fl. Extratrop. S. Austral. 150 & 252 (1890); F. Muell. & Tate, Trans. & Proc. Roy. Soc. S. Austral. 13: 104 (1890); Moore, Handb. Fl. New S. Wales 352 (1893); Tate, in P. Spencer, Rep. Horn Exped. 3: 173 (III 1896); F. Muell. & Tate, Trans. & Proc. Roy. Soc. S. Austral. 16: 374 (1896); Koch, Trans. & Proc. Roy. Soc. S. Austral. 22: 114 (1898); Dixon, Pl. New S. Wales 232 (1906); Guilfoyle, Austral. Pl. 305 (1911); J.M. Black, Trans. & Proc. Roy. Soc. S. Austral. 38: 468 (1914); Ewart & Davies, Fl. N. Territory 239 (1917); Collins, Proc. Linn. Soc. New S. Wales 48: 247 & 252, t. 16 (1923); J.M. Black, Fl. S. Austral. 3: 484, t. 200 (1926); C.A. Gardner, Enum. Pl. Austral. Occid. 114 (1931); J.M. Black, Fl. S. Austral. 2nd edn 4: 737, t. 1038A-C (1957); Chippendale, Trans. & Proc. Roy. Soc. S. Austral. 82: 335 (1959); Blackall & Grieve, W. Austral. Wildfl. 3: 593 (1965); J.S. Beard, Descr. Cat. W. Austral. Pl. 94 (s. dat. (Oct. 1965)); Althofer, Cradle of Incense 31, 92 (p.p. included *P. lithospermoides*), 93-97, 155, 159, 162, 165 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 453 (1981); Haegi, in J. Jessop (ed.), Fl. Central Austral. 309 & 310, t. 411 (1981); G.M. Cunningham et al., Pl. W. New S. Wales 580 (1981[1982]); Rotherham et al., Flowers & Pl. New S. Wales & S. Queensland 151 (1982). *Lectotype* (here chosen): *Mueller* s.n., -.x.1851, 'In alveis fluviorum glareosis siccis et in montibus petraeis prope Cudnaka', South Australia (lecto: MEL 43674 - upper left specimen; *isolecto*: MEL 43674 [excluding lectotype]; *probable isolecto*: 'In clivis rupestribus montium Flindersii prope Wullendunga et Cudnjaka', South Australia - MEL 43673).

Erect shrub, (0.2-)0.5-2 m high. *Branches* ± terete, usually with two faint 'lateral' grooves, very sparsely to sparsely hairy, particularly in grooves and at nodes (from leaf axil region to the next more distal nodal region between the opposite leaf bases) [up to c. 40 hairs/mm^2] or glabrous, hairs (when present) straight to ± curled, subpatent to antrorse, 0.1-0.2 mm long, very sparsely to sparsely glandular [up to c. 20 glands/mm^2]. *Leaves* light to dark green, usually dull, glabrous, rarely with an occasional hair, moderately glandular [30-40 glands/mm^2]; *petiole* absent or up to c. 1 mm long; *lamina* narrowly ovate to narrowly elliptic, rarely very narrowly elliptic, (4-)8-30(-38) × (1.5-)2-8(-10) mm [length to width ratio (2-)3.4-5.5(-11), length of maximum width from base to total lamina length ratio 0.4-0.5], base acute to subattenuate, often subdecurrent, margin entire, apex acute to obtuse; venation not visible, midrib faint and slightly raised on

abaxial surface. *Inflorescence* a frondose to frondo-subbracteose racemiform conflorescence, conflorescences sometimes arranged into a superconflorescence, uniflorescence monadic; 4- c. 12-flowered [per conflorescence]. *Pedicel* 1.3-2.3 mm long, glabrous, glands absent or moderately glandular [c. 40-50 glands/mm^2] (especially when in bud); *prophylls* usually inserted on distal third of pedicel [a_1 axis to anthopodium ratio (0.8-)3-8], opposite, narrowly ovate or narrowly elliptic to linear, (2.1-)3-6 mm long, 0.3-0.9 mm wide [length to width ratio 4.5-11.3, length of maximum width from base to total lamina length ratio 0.3-0.4], glabrous or sometimes with an occasional hair (particularly on margin), glands absent, base acute to attenuate, margin entire, apex acute to attenuate. *Calyx* light green, usually with faint purple tinge adaxially, glabrous, glands absent; *tube* 2.5-3.4 mm long; *abaxial lobe* very broadly to broadly ovate, 2.5-3.9 mm long, 2.3-3.9 mm wide [length to width ratio 0.9-1.1], apex obtuse; *adaxial lobe* broadly ovate to ovate, 4.6-6.6 mm long, 3-5.2 mm wide [length to width ratio 1.2-1.5], apex obtuse; [adaxial lobe length to abaxial lobe length ratio 1.1-1.4]. *Corolla* 10-17 mm long, white, inner adaxial and lateral surfaces of tube with purple lines present, inner abaxial surface of tube white with dull orange to yellow dots present (yellow-orange lines often present also), outer surface glabrous basally, sparsely to moderately hairy on lobes and distal part of tube [up to c. 32 hairs/mm^2], hairs 0.1-0.2 mm long, sparsely glandular [up to c. 20 glands/mm^2]; inner surface glabrous in tube and sparsely hairy on lobes [c. 20 hairs/mm^2], glands scattered; *tube* 10.3-11.4 mm long, diameter at mouth 5-6 mm; *abaxial median lobe* spathulate, 6.5-9.8 mm long, 8.5-9.1 mm wide [length to width ratio 0.8-1], apex slightly irregular and rounded, usually retuse (sinus c. 1 mm long); *lateral lobes* broadly elliptic to elliptic or broadly oblong, 5.2-8.5 mm long, 4.6-5.6 mm wide length [length to width ratio 1.2-1.8], apex obtuse to subrounded; *adaxial median lobe-pair* depressed to very broadly ovate, 5.5-10.4 mm long, 8.5-13.8 mm wide [length to width ratio 0.5-1.1], apex rounded and deeply bilobed (sinus 3-4.6 mm long). *Stamens* inserted 3.3-3.7 mm above base of corolla; filaments 3-5.2 mm long, glabrous; anthers 1-1.3 mm long, lobes with small basal acumen c. 0.2 mm long, not cristate, connective extended to form a basal appendage 2.3-2.9 mm long, terminating in 1-3 narrowly triangular trichomes. *Disc* 0.5-0.6 mm high. *Pistil* 10.7-13 mm long; *ovary* ± cylindrical to cupiform, c. 0.5 mm long, diameter at base c. 0.5 mm, lobes c. 0.1 mm long, densely glandular distally; style 10-11 mm long; *stigma lobes* 0.2-0.6 mm long. *Fruiting calyx* enlarged (abaxial lobe 10-12 mm long, 9-10 mm wide [length to width ratio 1-1.2]; adaxial lobe 4.3-5 mm long, 5.8-6 mm wide [length to width ratio c. 0.8]; [adaxial lobe length to abaxial lobe length ratio 2.2-2.3]). *Mericarps* 2-2.5 mm long, distally 1.2-1.4 mm extended beyond base of style, distal diameter 2.6-3 mm, moderately glandular distally; seeds ± ellipsoid, 1.4-1.5 mm long, c. 0.8 mm wide. Figure 9.

Selected specimens examined (c. 450 examined). NEW SOUTH WALES: North Western Plains: *Moore* 5690, 22.viii.1970, 'Tundalya', c. 25 miles SE of Louth (CANB, NSW); *Curran* 6, anno 1886, Cobar (MEL). - North Far Western Plains: *Althofer* 11, 23.ix.1949, near White Cliffs (NSW); *De Nardi* 845, 28.ix.1971, 2 km W. of Big Wallaby Tank (NSW). - South Western Plains: *G. Cunningham* s.n., -.ix.1972, c. 1.6 km N of Tallebung (AD); *De Nardi* 1102, 24.x.1972, 'Melton Grove', c. 60 km SW of Ivanhoe (NSW).

NORTHERN TERRITORY: Central North: *Beauglehole* (& *Errey*) 57937, 4.xii.1978, Hann Range (MEL); *Ising* s.n., -.viii.1973, MacDonald Downs Homestead (AD); *Winkworth* 538, 1.viii.1954, 10 miles NE of Woodygreen Homestead (BRI, CANB). - Central South: *Chinnock* 480, 24.viii.1973, Mt Olga (AD, MEL); *Chippendale* 97, 29.vii.1954, Billygoat Hill, Alice Springs (AD, BRI, CANB, MEL, NSW, PERTH); *Maconochie* 2486, 27.viii.1980, King's Canyon, George Gill Range (AD); *Munir* 5078, 20.viii.1975, Mt Cavenagh (AD, MEL).

SOUTH AUSTRALIA: Northern Arid: Northern Uplands and Alluvial Plains (Mt Davies): *Weber* 221, 30.x.1966, Mt Davies Road (AD); (Musgrave): *George* 5189, 20.vii.1963, 27 miles W. of Musgrave Park Homestead (PERTH); Western Sandplains (Sundown): *George* 5149, 20.vii.1963, Cave Hill (AD, NSW); (Illbillee): *Cornwall* 180, 3.vi.1972, Everard Park Homestead (AD); (Mt Sir Thomas): *Forde* 1478, 19.x.1960, Mt Wooltarlinna (CANB); Central Tablelands (Mt Margaret): *Andrews* s.n., 10.x.1968, Nilpinna Station (AD); (Maree): *Eichler* 12975, 25.ix.1965, near Padsey's Springs

Figure 9. a-d - *Prostanthera striatiflora*. a - Twig and flowers. b - Open corolla. c - Calyx and gynoecium. d - Stamens, ventral and dorsal views (*Carrick* 2967).

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Homestead (AD); (Breakaway): *Forde* 1004, 26.ix.1960, 16 miles N of Wintinna Homestead (CANB). - Western Pastoral: Central Salt Lakes and Plateaux (Chitaminga): *Lay* 157, 21.xi.1970, c. 50 km SSE of Kingoonya (AD); (Woomera): *Martin* s.n., -.viii.1954, near Woomera (NSW 128304); (Andamooka): *Murray* s.n., 9.vii.1927, Acacia Creek, South Gap (AD); (Acraman): *Symon* 8165, 5.x.1972, 2 km N of Chinaman Well (AD); Gawler Uplands (Gawler): *Conn* 673, 8.ix.1979, Miccollo Hill (MEL); (Pine Lodge): *Wilson* 496, 15.x.1958, hill N of Pine Hill Lodge (AD, UC); (Iron Knob): *Copley* 2304, 12.x.1968, Corinna Hill (AD). - Flinders Ranges: Northern Complex (Warraweena): *Ising* 466, s. dat., Mooloolooo (AD); (Balcanoona): *Eichler* 19654, 26.x.1967, Balcanoona (AD, MEL); (Outouie): *Norris* s.n., 28.ix.1981, Chambers Gorge (MEL); (Erragoona): *Whibley* 4104, 13.ix.1973, Moro Gorge (AD); (Gammon): *Conrick* AD 69, 28.x.1956, Sliding Rock Mine (AD); (Barilla): *Gandoger* s.n., 8.vii.1980, Terrapinna Waterhole (MEL); Southern Basin and Ranges (Wirrealpa): *Cooper* s.n., 30.ix.1942, Grindstone Range (AD); (Wilpena): *Filson* 3484, 8.x.1960, Tea Cosy Creek Gorge (AD, MEL); (Oraparinna): *Weber* 2691, 20.ix.1971, Banyeroo Valley (AD, MEL); (Brachina): *Kuchel* 1041, 24.viii.1963, Mt Aleck (AD); (Merna Mora): *Hill* 331, 2.viii.1955, near Hookina (AD); (Buckalowie): *Cleland* 141, 3.xii.1930, N of Baratta (K); (Buckaringa): *Symon* 8531, 24.iv.1973, Mt Brown (AD); (Willochra): *Cooper* s.n., 24.ix.1961, Gordon (AD). - Eastern Pastoral: Olary Spur (Bimbowrie): *Kuchel* 3096, 26.viii.1972, Cathedral Rock (AD, MEL); (Koonamore): *Partridge* 5, 21.ix.1928, Bumbumbie Springs (AD, CANB); (Tiverton): *Carrick* 2135, 14.xi.1968, Cronje Hill (AD, MEL); (Terowie): *Rogers* 1813, 18.ix.1969, Oodla Wirra (AD). - Eyre and Yorke Peninsulas: Northern Myall Plains (Lake Gilles): *Burkett* s.n., anno 1869, Lake Gilles (K); (Buckleboo): *Chinnock* (& *Copley*) 1856, 1857, 7.ix.1974, Corunna Hill South (AD); Central Mallee and Dunes (Kyancutta): *Johns* 3700, 28.x.1935, Wudinna (AD); Gulf Plains (Kallora): *Menzel* s.n., -.xi.1896, Port Wakefield (AD).

WESTERN AUSTRALIA: Eremaean (Giles): *Chinnock* 550, 27.viii.1973, Glen Cummin Gorge (AD, MEL); *Forde* 1427, 17.x.1960, 31 miles NW of Mt Squires (CANB); *George* 5290, 22.vii.1963, Winburn Rock (KP, PERTH); *Johnson* 5112, 23.ix.1958, 30 miles N of Blackstone Ranges (PERTH).

Distribution. Occurs in New South Wales, the Northern Territory, South Australia and Western Australia. Figure 14.

Ecology. Commonly occurs in skeletal soils of rocky areas (either on hill slopes, in crevices of steep rock faces or frequently along drainage lines and in creek beds). The rock type is usually porphyric rhyodacite (Gawler Rangers) or granite. *Lazarides* 6073 records it growing on limestone (The Garden Station, Northern Territory) and *Copley* 2304, *Maconochie* 1902 and *De Nardi* 1102 record it on sandstone (Corunna Hill, South Australia; Longs Range, Northern Territory; 'Melton Grove', New South Wales, respectively).

This species usually occurs in open woodland communities associated with various *Acacia* spp. (e.g. *A. aneura*, *A. montana*, *A. sowdenii*, *A. tarculensis*, *A. victoriae*), *Callitris* sp., *Cassia* spp., *Eremophila* spp., *Eucalyptus intertexta*, *Ficus platypoda*, *Ptilotus obovatus*, *Sida virgata* and *Triodia spicata*.

Notes. This species is characterized by having a white corolla which has purple striations on its inner surface (similar to *P. sericea*, *P. campbellii*, and *P. althoferi*), a relatively long anther appendage (2.3-2.9 mm long), very sparsely hairy branches and leaves which usually appear to be glabrous. A few specimens (e.g. *Perry* 5458) are slightly more densely hairy. The floral features of this species are very similar to those of *P. nudula*. This species appears to have affinities with *P. albiflora*, *P. magnifica* and possibly with *P. nudula*.

Although Bentham (1870) and Bailey (1883, 1901 & 1913) recorded this species for Queensland, it appears that they were referring to a variant of *P. lithospermoides*.

M. Schneider s.n., -.vii.1968 (AD 97033064) records this species from 'West Kimberley. Derby District'. This is assumed to be possibly an incorrect locality.

Prostanthera Hill (Western Australia: Lat.: 25° 39′ S, Long.: 128° 11′ E) is presumably named after this species. *Johnson* 5112 (PERTH) may have been collected there ('30 miles N of Blackstone Ranges').

A small-leaved variant (leaves 3-8 mm long, 1.2-2 mm wide [length to width ratio 2.5-4] occurs in the Docker River/Petermann Range area of the Northern Territory and in the adjacent Schwerin Mural Crescent of Western Australia. It is slightly more glandular and hairier than the more common larger-leaved variant. The taxonomic status of the former is not known.

Specimens examined (of small-leaved variant). NORTHERN TERRITORY: south-western Central South: *Beauglehole* (& *Errey*) 60795, 22.ix.1978, S side of Petermann Ranges (MEL); *Carolin* 5290, 18.viii.1966, Mt Phillips (SYD); *Latz* 862, 28.x.1970, Hull River (AD); *Latz* 8064, 12.ix.1978, 6 km SE of Docker River Settlement (MEL).
WESTERN AUSTRALIA: Eremaean (Giles): *Maconochie* 818, 23.ix.1969, Gill Pinacle, Schwerin Mural Crescent (AD, MEL).

Conservation status. This species is not considered to be at risk, although it is sometimes locally rare. It usually forms relatively large populations.

Common names. Jockey's cap (Cunningham et al. 1982, p. 580), streak-flowered Mint Bush (Guilfoyle 1910, p. 305), striped mintbush (Rotherham et al. 1982, p. 151) and striated mintbush (as cited in Cunningham et al. 1982, p. 580). The creation of another common name for this species, by Cunningham et al. (1982), has further confused the vernacular nomenclature of this species.

One Aboriginal name (Dieyerie dialect) for this species is 'Yulpoo' (*Koch* 28).

20. **Prostanthera albiflora** Conn, sp. nov. (Figure 10e-g)

Species nova Sectionis *Prostantherae*. *Frutices* 0.5-2 m. alti. *Rami* et ramuli subquadrangulares usque plus minusve teretes, striati, pilis sparsis usque moderatis vestita, pilis 0.2-0.4 mm longis, glandibus sparsis vestita. *Folia* diluta viridia; *petiolus* 0.5-1.6 mm longus, pilis sparsissimis usque moderatis vestita, glandibus moderatis vestita; *lamina* anguste ovata usque anguste elliptica, 5-18 mm longa, 3-6 mm lata, basi plerumque attenuata vel raro rotundata, margine integro, interdum incisuris, apice acuto usque obtuso, raro rotundato, glabra vel pilis dispersis vestita. *Pedicellus florum* 1.6-3.1 mm longus, pilis sparsissimis usque moderatis vestita, pilis circa 0.2 mm longis, glandibus moderatis vestita; *prophyllis* in dimidio distali pedicello affixis, anguste ellipticis usque anguste obovatis, 2.2-3.4 mm longis, 0.4-0.8 mm latis. *Calyx* dilutis viridis, pilis moderatis usque densis vestita, glandibus sparsissimis usque sparsis vestita; *tubus* 3-5 mm longus; *lobus abaxialis* latissime ovatus, 2.2-3.8 mm longus, 3.1-4.9 mm latus, apice obtuso usque rotundato, interdum emarginato; *lobus adaxialis* latissime ovatus usque late ovatus, 4.6-13 mm longus, 3.9-12.2 mm latus, apice obtuso usque rotundato. *Corolla* 15-22 mm longa, alba, maculae fauci dilutae caeruleae, extra pilis sparsis usque moderatis vestita, glandibus sparsissimis usque sparsis vestita, interius glabra vel pilis sparsissimis usque sparsis vestita, glandibus absentibus; *tubus* 11-16 mm longus; *lobus abaxiali-medianus* plus minusve spathulatus, 6-7.2 mm longus, 6-9 mm latus, apice leviter irregulari et rotundato, *lobis lateralibus* latissime ovatis usque ellipticis, 5-5.9 mm longis, 4.2-5 mm latis, apice obtuso usque rotundato, *pari loborum adaxiali-mediano* depresse ovato usque latissime ovato, 7.5-9.8 mm longo, circa 13 mm lato, apice leviter irregulari et rotundato, bilobata, sinu circa 3 mm longo. *Stamina* 8-9 mm e basi corollae affixa; filamenta 5-7.3 mm longa; antherae 1.4-1.8 mm longae, appendice 2.3-2.5 mm longa. *Pistillum* 18-20 mm longum; ovarium 0.5-0.6 mm longum, glandibus densis vestita, pilis sparsis vestita distaliter; stylus circa 19 mm longus; lobis stigmatis 0.6-0.7 mm longis. *Calyx fructus* auctus. *Mericarpia* non visus.

Typus: Weber 4826, 26.ix.1975, W of road between Agnew and Wiluna, c. 8 km N of Yakabindie Homestead, Violet Range, Western Australia (holo: MEL 1531780; iso: AD 97626262, BRI, CANB, E, K, MEL 1531781, MO, NSW, PERTH, S, UC).

Erect spreading shrub, 0.5-2 m high. *Branches* subquadrangular to ± terete, striate, sparsely to moderately hairy [10-58.3 hairs/mm^2], hairs curved to curled, sometimes almost straight, usually antrorse, 0.2-0.4 mm long, occasional multicelled hairs present at nodes (c. 0.6 mm long); sparsely glandular [14-20 glands/mm^2]. *Leaves* light green; *petiole* 0.5-1.6 mm long, with an occasional hair or sparsely to moderately hairy [25-80 hairs/mm^2], moderately glandular [50-67 glands/mm^2]; *lamina* narrowly ovate to narrowly elliptic, sometimes circular to elliptic, 5-18 × 3-6 mm [length to width ratio (1.1-) 1.8-3.8, length of maximum width from base to total lamina length ratio 0.4-0.6], base attenuate and often shortly decurrent, rarely rounded, margin entire, sometimes with 1 or 2 small notches, apex acute to obtuse, rarely rounded; venation faint to indistinct, midrib raised on abaxial surface, slightly sunken on adaxial surface, glabrous or with a few hairs on midrib and/or margin, moderately to densely glandular [65-77 glands/mm^2]. *Inflorescence* a frondose racemiform conflorescence, uniflorescence monadic; 2-12(-16)-flowered [per conflorescence]. *Pedicel* 1.6-3.1 mm long, very sparsely to moderately hairy [up to 40 hairs/mm^2]; hairs c. 0.2 mm long; moderately glandular [60-73 glands/mm^2]; *prophylls* inserted on distal half of pedicel [a_1 axis to anthopodium ratio 1.5-5], opposite, narrowly elliptic to narrowly obovate, 2.2-3.4 mm long, 0.4-0.8 mm wide [length to width ratio 3.5-8.5, length of maximum width from base to total lamina length ratio 0.6-0.9], base attenuate, margin entire, apex acute to obtuse, glabrous or with occasional hairs. *Calyx* light green; outer surface moderately to densely hairy [50-150 hairs/mm^2], tube often more densely hairy than lobes, sparsely glandular [6-26.7 glands/mm^2]; inner surface moderately to densely hairy [77-96.7 hairs/mm^2], very sparsely to sparsely glandular [8.3-11.7 glands/mm^2]; *tube* 3-5 mm long; *abaxial lobe* very broadly ovate, 2.2-3.8 mm long, 3.1-4.9 mm wide [length to width ratio 0.8-1], apex obtuse to rounded, sometimes emarginate (sinus up to c. 0.8 mm long); *adaxial lobe* very broadly to broadly ovate, 4.6-13 mm long, 3.9-12.2 mm wide [length to width ratio 0.8-1.3], apex obtuse to rounded; [adaxial lobe length to abaxial lobe length ratio 1.5-4]. *Corolla* 15-22 mm long, white, with pale blue spots in throat (*Blockley* 426); outer surface sparsely to moderately hairy [27-78 hairs/mm^2], very sparsely to sparsely glandular [up to c. 10 glands/mm^2]; inner surface glabrous or very sparsely to sparsely hairy in mouth and base of lobes [up to c 20 hairs/mm^2], glands absent; *tube* 11-16 mm long, diameter at mouth c. 5-6 mm; *abaxial median lobe* ± spathulate, 6-7.2 mm long, 6-9 mm wide [length to width ratio 0.8-1], apex slightly irregular and rounded, often broadly retuse (sinus c. 1 mm long); *lateral lobes* broadly ovate to elliptic, 5-5.9 mm long, 4.2-5 mm wide [length to width ratio 1-1.4], apex obtuse to rounded; *adaxial median lobe-pair* depressed to very broadly ovate, 7.5-9.8 mm long, c. 13 mm wide [length to width ratio 0.6-0.8], apex slightly irregular and rounded, bilobed (sinus c. 3 mm long). *Stamens* inserted 8-9 mm above base of corolla; filaments 5-7.3 mm long, glabrous; anthers 1.4-1.8 mm long, not cristate, lobes with small basal acumen c. 0.2 mm long, connective extended to form a basal appendage 2.3-2.5 mm long, terminating in 5-10 narrowly triangular trichomes. *Disc* c. 0.8 mm high. *Pistil* 18-20 mm long; *ovary* ellipsoid, 0.5-0.6 mm long, diameter at base 0.7-0.9 mm, densely glandular, lobes 0.1-0.2 mm long, sparsely hairy distally; *style* c. 19 mm long; *stigma lobes* 0.6-0.7 mm long. *Fruiting calyx* enlarged (abaxial lobe 5-6 mm long, 5.5-6 mm wide [length to width ratio 0.8-1.1]; adaxial lobe 12-13 mm long, 11-11.5 mm wide [length to width ratio 1-1.1]; [adaxial lobe length to abaxial lobe length ratio 2-2.4]). *Mature mericarps* not seen; immature mericarps moderately hairy distally, densely glandular.

Specimens examined. WESTERN AUSTRALIA: Eremaean (Fortescue): *Beard* 2880, 18.viii.1963, Wittenoom Gorge (KP, PERTH); *Blockley* 16, 14.ix.1965, Duck Creek, Juna Downs Station (KP, PERTH); *Blockley* 426, 16.ix.1966, E from Mt Bruce Homestead (KP); *Carr* 4943, 10.viii.1974, Hancock Gorge, Hamersley Range National Park (AD, MEL, RSA); *Fairall & Lullfitz* L.2739, 22.x.1963, Diamond Drillers Hill, Wittenoom (KP); (Carnarvon): *Gardner* 6072, 23.ix.1941, Kennedy Range (PERTH); (Ashburton): *Wittwer* S. 1765 , -.ix.1971, Mt Augustus Homestead (KP); (Austin): *Barnes* WA 17489, anno 1968, N of Lake Ballard (Perth); *Frazer* s.n., anno 1919, between Kunnunoppin & Mt Marshall and Lake Barlee (NSW); *Gardner* 13430, 3.ix.1961, 150 km SE of Meekatharra (PERTH); *King* s.n., anno 1886, near Lake Austin (MEL);

Figure 10. a-d - *Prostanthera magnifica*. a - Twig and flowers. b - Open corolla. c - Calyx and gynoecium, with abaxial calyx lobe removed. d - Stamens, ventral and dorsal views (*Ashby* 1913). e-g - *P. albiflora*. e - Twig and flowers. f - Calyx and prophylls. g - Stamens, dorsal view (*Weber* 4826).

Lullfitz L.2404, 8.ix.1963, 43 km N of Sandstone (PERTH); *Sewell* s.n., anno 1890, Murchison River (MEL); *Speck* 1502, 2.x.1958, near Meekatharra (AD, CANB, MEL, NSW, PERTH); *Weber* 4827, 26.ix.1975, c. 8 km N of Yakabindie Homestead (AD, BM, HO, MEL, NSW, PERTH - same locality as Type).

Distribution. Endemic to the Eremaean Botanical Province (Austin, Carnarvon & Fortescue Districts) of Western Australia. Figure 14.

Ecology. Occurs along watercourses in sandy loam or ironstone-rich soils.

Notes. *P. albiflora* has strong affinities with *P. magnifica*. It differs from the latter by having a white corolla (*P. magnifica* has a pale mauve, pale blue to pink corolla), a yellowish green calyx which is hairy on the outer surface (*P. magnifica* has a dark mauve to purple calyx which is glabrous on the outer surface), prophylls 2.2-3.4 mm long (*P. magnifica* has prophylls (4.5-)6-13 mm long), and the anthers are not cristate (in *P. magnifica* the anthers are cristate).

Morse 173 (CBG 8503963) collected from 'Top of Durba Hills, Keartland district', appears to be a small-flowered form of this species.

Conservation status. Not known.

21. **Prostanthera magnifica** C.A. Gardner, J. Roy. Soc. W. Austral. 27: 196 (1942); Blackall & Grieve, W. Austral. Wildfl. 3: 595 (1965); J.S. Beard, Descr. Cat. W. Austral. Pl. 94 (s. dat. [Oct. 1965]); Althofer, Cradle of Incense 79, 154,156, 157 & 159 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 455 (1981); C.A. Gardner, Wildfl. W. Austral. 14th edn 122 (1981). - *Lectotype* (here chosen): *Blackall* 2783, -.ix.-[early 1900's], 20 miles from Mullewa towards Morawa, Western Australia (lecto: PERTH; isolecto: MEL 667920, PERTH).

P. magnifica var. *asperata* C.A. Gardner, J. Roy. Soc. W. Austral. 27: 196 (1942); Blackall & Grieve, W. Austral. Wildfl. 3: 595 (1965); Althofer, Cradle of Incense 154 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 455 (1981). - *Lectotype* (here chosen): *Blackall* 3458, -.ix [13.x.].1937, 'Top of Mt Churchman' [handwritten on small tag in Blackall's hand], 'Prostanthera magnifica C.A. Gardner var.' [in Gardner's hand], Western Australia (lecto: PERTH, fragment in K (n.v.); isolecto: PERTH - 3 sheets) [refer Typification].

Slender to spreading erect shrub, 0.4-2.5 m high. *Branches* ± terete, slightly flattened laterally and/or ridged, sparsely to moderately hairy, rarely glabrescent [(c. 5-)25-90 hairs/mm^2]; hairs sometimes restricted to internodal surface from within leaf axils to the next node (between bases of leaves), often only base of hair persistent, curled to ± straight, antrorse, up to 0.3 mm long; very sparsely glandular [up to c. 10 glands/mm^2]. *Leaves* green, with an occasional hair to very sparsely hairy [up to c. 10 hairs/mm^2], indumentum denser or restricted to petiole, midrib and margin, [hairs as for branches], with an occasional gland to very sparsely glandular [up to c. 17 glands/mm^2]; *petiole* 1-4(-6) mm long; *lamina* elliptic to narrowly elliptic, sometimes narrowly ovate, rarely narrowly obovate, ([? immature] 6-)15-44 × ([? immature] 2-)5-10(-16) mm [length to width ratio 2.2-4.6, length of maximum width from base to total lamina length ratio 0.3-0.5(-0.7)], base attenuate to acute, margin often slightly irregular, entire or sometimes with an occasional tooth (teeth 1-1.5 mm long), appearing denticulate because of scattered hairs and/or hair bases, apex acute to rounded, often with a small mucro c. 0.3-0.5 mm long; venation faint to indistinct; midrib raised on basal portion of abaxial surface, ± level with adaxial surface; [petiole length to lamina length ratio up to 0.4]. *Inflorescence* a frondose racemiform conflorescence (leaves of conflorescence smaller than vegetative leaves), uniflorescence monadic; 6-18-flowered [per conflorescence]. *Pedicel* 2.5-6 mm long, glabrous or very sparsely hairy [up to c. 5 hairs/mm^2], hairs 0.1-0.3 mm long, very sparsely to moderately glandular [(less than 10)10-67 glands/mm^2], glands rarely absent; *prophylls* inserted near base of calyx (a $_1$ axis to anthopodium ratio 0.1-0.3), opposite, narrowly ovate, often curved, flat, (4.5-)6-13 mm long, (0.5-)0.6-1.4(-2.6) mm wide [length to width ratio 4-9.5, length of maximum width from base to total lamina length ratio 0.2-0.3], glabrous or sometimes with an occasional hair basally, base attenuate (rarely obtuse), margin entire, apex attenuate. *Calyx* dark mauve to purple;

outer surface glabrous; inner surface sparsely to moderately hairy basally [c. 20-42 hairs/mm^2], hairs c. 0.1 mm long, glabrous distally, very sparsely glandular [c. 5-12 glands/mm^2]; *tube* 2-4 mm long; *abaxial lobe* broadly ovate to ovate, 4-10 mm long, 4-8 mm wide [length to width ratio 1-1.5], apex obtuse; *adaxial lobe* very broadly ovate to ovate, 15-26 mm long, 10-23 mm wide [length to width ratio 1-1.8], apex obtuse to rounded; [adaxial lobe length to abaxial lobe length ratio 2.2-3.1]. *Corolla* 16-25(-30) mm long, pale mauve (lilac), pale blue to pink, inner abaxial surface of tube and base of abaxial median lobe with dark purple spots; outer surface glabrous at base, otherwise moderately hairy [30-37 hairs/mm^2], very sparsely glandular [up to c. 10 glands/mm^2]; inner surface glabrous basally, distally moderately to densely hairy [30- c. 100 hairs/mm^2], glands absent or with an occasional gland present; *tube* 15-20 mm long, diameter at mouth 8-10 mm; *abaxial median lobe* very broadly obovate to obovate, or subspathulate, 3.9-7.4 mm long, 2.6-7.2 mm wide [length to width ratio 1-1.8], apex often slightly irregular, rounded or often subtruncate, sometimes asymmentrical; *lateral lobes* very broadly ovate to ovate, or broadly subangular-ovate, 3.9-6 mm long, 2.2-5.6 mm wide [length to width ratio 0.9-1.8], apex obtuse; *adaxial median lobe-pair* perdepressed to very broadly ovate, 3.9-8 mm long, 5-24.7 mm wide [length to width ratio 0.3-0.7], apex rounded, emarginate to bilobed (sinus 1-2.2 mm long). *Stamens* inserted 7.2-8.5 mm above base of corolla; filaments 7.8-9.1 mm long, glabrous or with a few scattered hairs (hairs c. 0.2 mm long); anthers 1.8-2.5 mm long, usually cristate dorsally, lobes with small basal acumen c. 0.3 mm long, connective extended to form a basal appendage 2-5 mm long, terminating in up to c. 5 narrowly triangular trichomes. *Disc* 0.4-0.5 mm high. *Pistil* 20-24 mm long; *ovary* ± cylindrical-obovoid, 0.7- c. 1 mm long, diameter at base 0.8-1 mm, lobes c. 0.3 mm long, glabrous, glands absent; *style* 16-22 mm long; *stigma lobes* c. 0.7-1 mm long. *Fruiting calyx* unchanged or slightly enlarged (abaxial lobe 7-12 mm long, 5-8 mm wide [length to width ratio 1-1.8]; adaxial lobe 21-30 mm long, 15-28 mm wide [length to width ratio 1-1.6]; [adaxial lobe length to abaxial lobe length ratio 0.3-0.4]). *Mericarps* 2-3 mm long, distally 1.5 mm extended beyond base of style, distal diameter 2.1-2.6 mm; seeds ± cylindrical, c. 2.5 mm long, 1-1.5 mm wide. Figure 10a-d.

Selected specimens examined (44 examined). WESTERN AUSTRALIA: Eremaean (Austin): *Corrick* 9146, 2.x.1984, 19 km W of Hospital Rocks (HO, MEL, PERTH) *Gardner* 7840, 13.x.1945, Tuckanarra Creek (PERTH); *George* 901, 20.viii.1960, 37 miles S of Paynes Find (PERTH); (Coolgardie): *Conn* 2292, 20.ix.1985, Mt Churchman (MEL); *Davies* 461, -.xi.1964, near Mt Jackson (PERTH). - South-West (Irwin): *Carson* s.n., 15.x.1940, 30 miles E of Ajana (PERTH); *Lipple* s.n., 16.ix.1960, Wonthella (PERTH); (Avon): *Ashby* 1913, 26.viii.1966, Mullewa (AD); *Gardner* 9549, -.viii.1950, Booraan (PERTH).

Distribution. Endemic to the Eremaean Botanical Province (Austin & Coolgardie Districts) and South-West Botanical Province (Avon & Irwin Districts) of Western Australia. Figure 14.

Ecology. Occurs amongst granitic outcrops and on ironstone hillside areas, in red sands and sandy loam soils, often associated with *Acacia aneura.*

Typification. There are four sheets of *Blackall* 3458 (the type of *P. magnifica* var. *asperata*) held at PERTH. Two sheets have only one specimen mounted on each. One of these has 'Prostanthera magnifica C.A. Gardner var.' [in Gardner's hand] written on one of Gardner's 'Type' labels. This latter specimen has been chosen as the lectotype.

Notes. The floral features of this species readily distinguish it from other species of *Prostanthera* section *Prostanthera.* The adaxial calyx lobe is very large (15-26 mm long, 10-23 mm wide) and soon becoming purple in flower and fruit. The corolla tube is very long (15-20 mm long) such that the corolla is superficially similar to those species of Section *Klanderia.* The anther appendage is much longer (2-5 mm long) than any of the other Western Australian species of Section *Prostanthera.*

P. magnifica var. *asperata* has been reduced to synonymy because it appears to represent a slightly smaller-leaved variant, which also tends to have slightly shorter flowers than the typical variant of this species. However, there is considerable overlap in all features studied such that most specimens can not be confidently classified into either taxon. For example, *Corrick* 9146 shows considerable variation in leaf size, but all other features suggest that this is a typical specimen of *P. magnifica*. A consideration of climatic factors may explain some of the variation observed because the specimens with smaller leaves tend to occur in the drier regions of the total distribution area.

Conservation status. Does not appear to be threatened or endangered.

Species of Uncertain Status

Prostanthera canaliculata F. Muell. var. *canosericea* Benth., Fl. Austral. 5: 102 (1870) (as 'Var. ? *canosericea*'); Althofer, Cradle of Incense 154 (1978); Grieve (ed.), Blackall & Grieve, W. Austral. Wildfl. 3B: 452 (1981) (as 'var. ? *canosericea*'). *Type*: *Drummond* (4th Collection) 164, s. dat., s. loc., Western Australia (MEL 42997).

Note. The status of this taxon is unclear since the Type is inadequate, with only immature fruits present (flowers lacking). This specimen has the small leaves similar to those of *P. canaliculata*, but the whole specimen is very densely hairy (similar to *P. althoferi* ssp. *althoferi* and *P. wilkieana*). *P. canaliculata* has glabrous to very sparsely hairy leaves, pedicels and calyces, even though the stems are usually densely hairy. This taxon could represent a small-leaved variant of *P. althoferi* ssp. *althoferi* or *P. wilkieana*, or a hairy variant of *P. canaliculata*. Until adequate material is available, it is not possible to clarify the taxonomic status of this taxon

Specimens examined. WESTERN AUSTRALIA: *Adams* s.n., anno 1889, 'Interior of W.A.' (MEL 43803); *Crawford* 56, anno 1887, 'between Victoria Springs and the W end of the Great Bight' (MEL 42971); *Merrall* s.n., anno 1888, Golden Valley (? Mine) (MEL 43869); *Moore* s.n., anno 1895, 'West Australian goldfields' (NY); *Mueller* s.n., s. dat. upper Kalgan (MEL 43002).

Acknowledgements

I sincerely thank the Directors and Curators of the many herbaria who made available loans of herbarium material. I gratefully acknowledge Mrs E.L. Robertson's advice on the type locality of *P. nudula*. Mr K.R. Newbey generously donated, from his private herbarium, the isotype of *Prostanthera verticillaris* to MEL.

The plant illustrations were skilfully done by Mr L. Dutkiewicz (then AD) (Figure 1a-d, 2, 5, 8a-e, 9, 10a-d) and Ms A. Podwyszynski (MEL) (Figure 1e & f, 3, 4, 6, 7, 8F, 10e-g).

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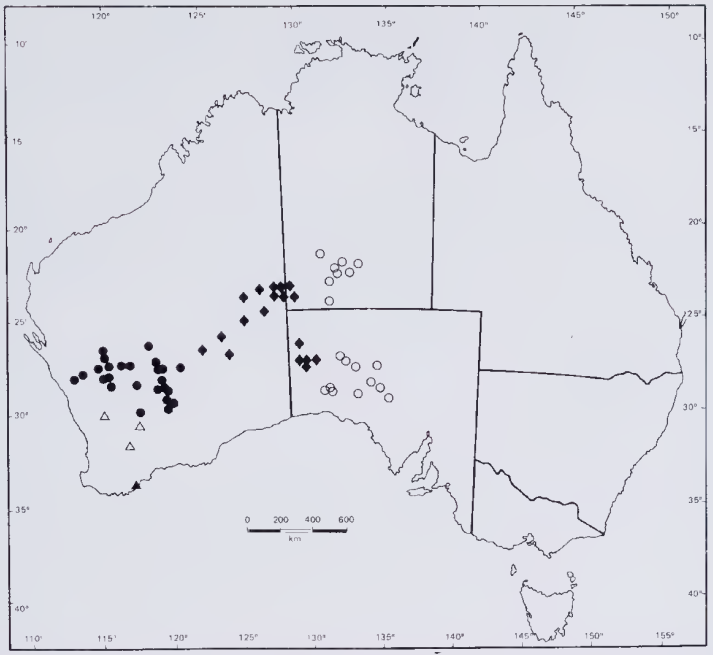

Figure 11. Distribution map of *Prostanthera althoferi* ssp. *althoferi* (dot), *P. althoferi* ssp. *longifolia* (circle), *P. nanophylla* (open triangle), *P. sericea* (solid diamond), *P. verticillaris* (solid triangle).

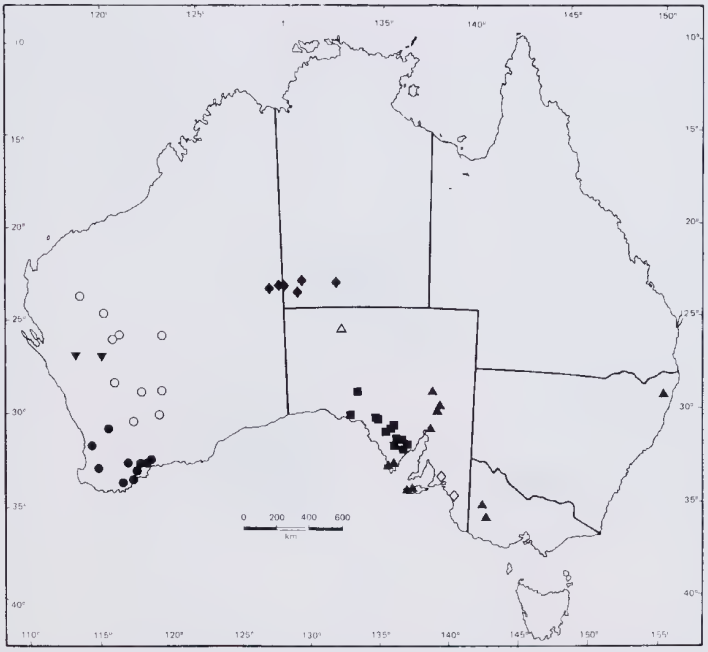

Figure 12. Distribution map of *Prostanthera ammophila* (solid square), *P. campbellii* (circle), *P. canaliculata* (dot), *P. centralis* (solid diamond), *P. eurybioides* (open diamond), *P. nudula* (open triangle), *P. petrophila* (solid inverted triangle), *P. spinosa* (solid triangle).

Figure 13. Distribution map of *Prostanthera eckersleyana* (solid diamond), *P. scutata* (open triangle), *P. splendens* (solid square), *P. wilkieana* (circle).

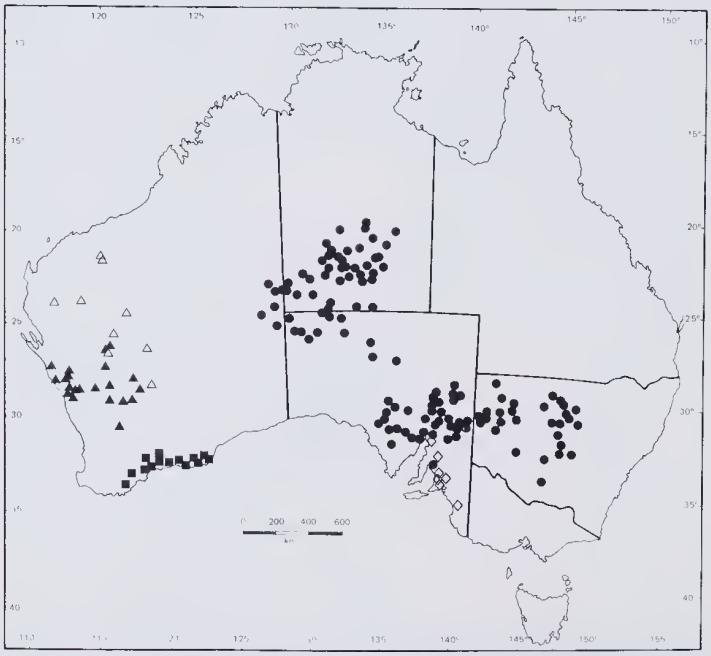

Figure 14. Distribution map of *Prostanthera albiflora* (open triangle), *P. baxteri* (solid square), *P. behriana* (open diamond), *P. magnifica* (solid triangle), *P. striatiflora* (dot).

Index to Names and Synonyms in *Prostanthera*

Names of new taxa, new combinations, and names with new status appear in bold type, other accepted names and epithets appear in roman, and synonyms in italic. For an accepted name, reference is made only to the page where the main entry begins; for a rejected name, only the page where it is listed as a synonym of an accepted name is indicated.

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(4) English description (indented).
(5) *Other specimens examined* or *Selected specimens examined*, as appropriate, preferably including number of collections examined.
(6) *Distribution.*
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(9) *Fruiting period.*
(10) *Typification* (discussion).
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(13) *Conservation status.*
(14) *Etymology.*

Synonymy. The desired format is that used by P. G. Wilson, Nuytsia 4: 135-262.

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(2) Book titles in literature citations—Stafleu, F. A. & Cowan, R. S. (1976-86). "Taxonomic Literature.". Edn 2. (I.A.P.T.: Utrecht.) (But with capital initial letters.)—Green, J. W. Edn 2. Pp. 20-24. (Department of Agriculture: Perth.)

(3) Journal titles in literature citations and reference lists—Lawrence, G.H.M. et al. (1986). "B-P-H (Botanico-Periodicum-Huntianum)."—Green loc. cit.

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Structure of papers. Authors are encouraged to use the conventional structure of scientific papers when a complete study is being reported (e.g. a revision). A *methods* section should include the method of drawing up the descriptions from specimens, extent of search for types, and discussion of concepts for choice of taxonomic categories. A *discussion* section should be considered, which could include some or all of the following: a summary of the findings, emphasising the most significant; interpretation of the results in the light of other relevant work; statement of new problems which have arisen; advising of aspects which are to be followed up; suggestion of topics which others might usefully pursue; prediction and speculation.

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